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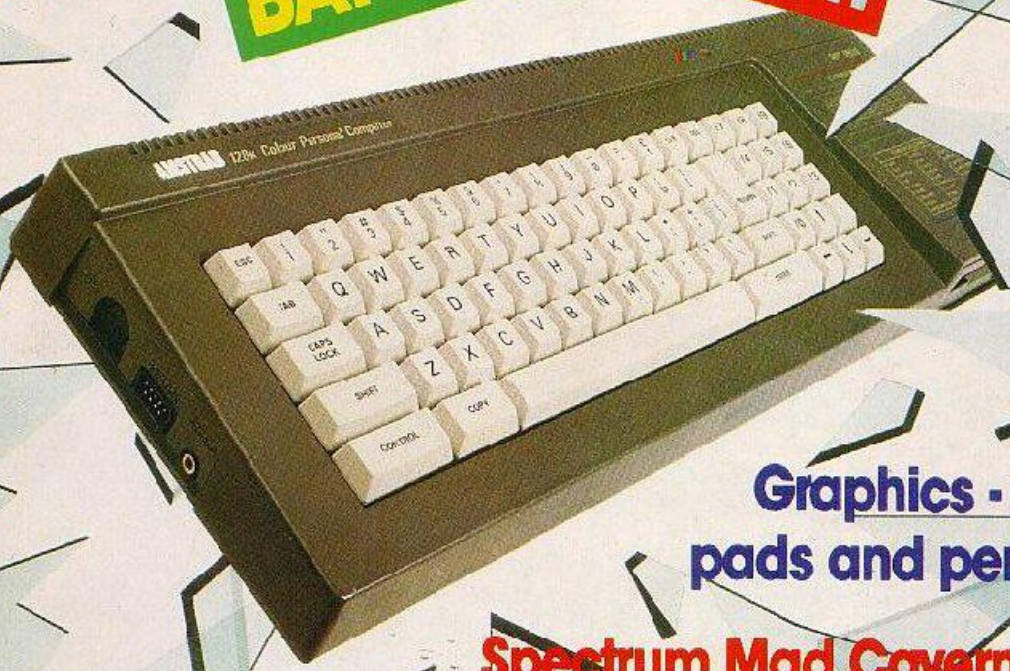
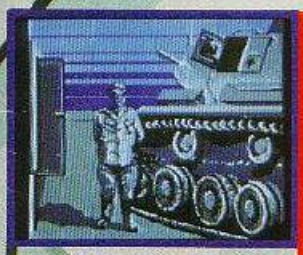


Graphics - digitiser, pads and pens tested

Spectrum Mad Caverns, Turtles and Pseudodisc

CBM-64 Snake, Macros and Rockfall



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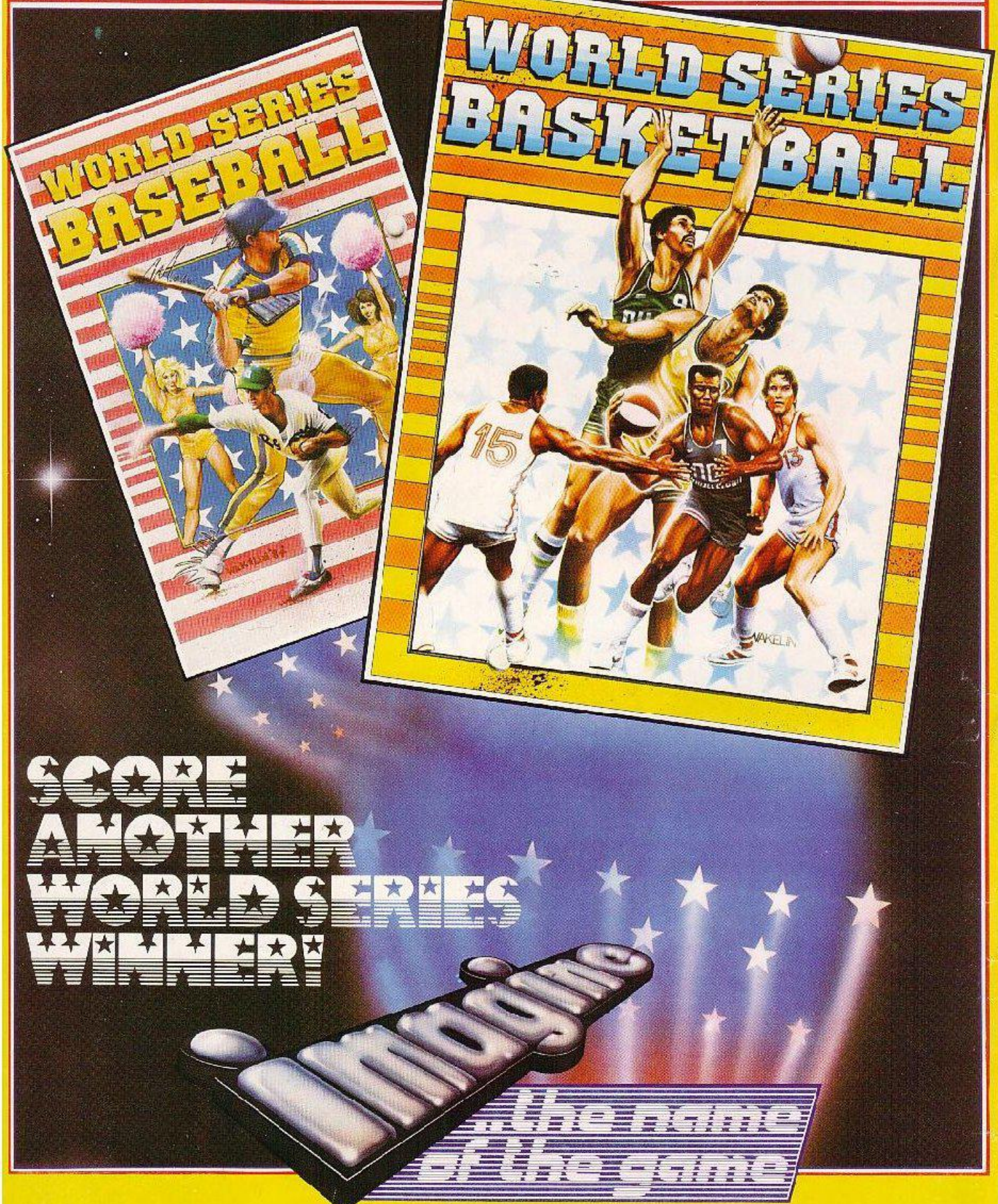

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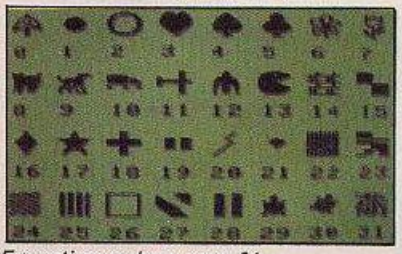

Education review: page 51.

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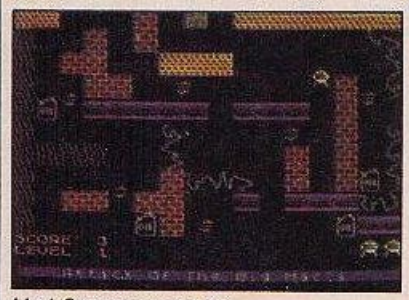

Mad Caverns: page 64.

12 NEWS: Eureka — Britain finds a European alternative to MSX: Commodore Amiga launch; Acorn reborn; Sinclair future; CBM-128 price £269; Pi-Man found.

19 YOUR LETTERS: Jumping out of For/Next loops — a professor writes; an enraged reader calls out Kath to account; something fishy about Micronet 800?

23 SOFTWARE SHORTLIST: Memories of the UN police action in Korea relived in Mig Alley Ace; Frank Bruno and Rocco fight it out; Martex's stunning Highway Encounter.

37 HARDWARE HITLIST: Logotron sprite board for the BBC Micro; and Minor Miracle's modem featuring Databeeb communications package — all the add-ons and more.

39 QUEST CORNER: The classic adventure continues — Melbourne House's Mordon's Quest; roll up for the magical mystery tour with the Beatle Quest.

40 AMSTRAD'S BATTERING RAM: Yee-hee! 128K micro plus disc plus monitor and CP/M — all this for only £300. Excited? Simon "Scoop" Beesley certainly is.

43 AMSTRAD 6128 COMPETITION: Win one of the new Amstrad machines exclusively reviewed in *Your Computer* this month. You saw it here first, remember.

44 MUD — MULTI-USER DUNGEON: Lee Paddon plunges into the modem dungeon; your chance to win a MUDpack — map, instructions — all you need to get into MUD.

46 THE LIGHTPEN FANTASTIC — graphics, lightpens, plotters. John Dawson scribbles away and introduces you to all the hardware you need for micro-doodling.

51 EDUCATION — SWOTWARE AND THE PUPIL: Smartest girl in school Josephine Adams delivers an end of term report on so-called educational software.

56 INSIDE US GOLD: Meirion Jones sneaks out with candid shots of Desert Fox, Winter Games, Goonies, Zorro and glimpses an Alternative Reality.

60 SPECTRUM MIRA: Allows you to do something you wouldn't normally be able to do — turns your Microdrive into more of a disc drive with random access.

63 PHILIPS MONITOR: Competition to win a £300 Philips CM-8533 as first prize to make life brighter.

64 SPECTRUM MAD CAVERNS: Karl Jeffery brings you another in our popular unofficial series of games that look like Boulderdash. Ten different screens.

68 KING BURGER: You must deal with a hostile fried egg called Freda.

72 BBC CORE WARS: How to eat programs. Jon Cottrell.

76 CBM-64 ROCK FALL: Paul Hammond brings you a game in which you have to guide a little man around 10 caves, collecting diamonds, dodging rocks. A favourite.

78 SPECTRUM TURTLES: No more need you dream of blue turtles, Ian Collier has put flipper to keyboard and brought you a Logo graphics program for the Spectrum.

80 CBM-64 MACRO-EDITOR: Define simple one-line Basic routines to help in the development of a program. Geoff Hatto's blow to structured programming.

82 AMSTRAD CPC-464 TIMEBOMB: Another Amstrad exclusive. Arnold the Anarchist has blundered in his bomb-planting. C Turner lets you help the cause.

84 TELSOFT: Games on our exclusive modem service this month are: CBM-64 Snakes, Basic Macros, BBC Core Wars and King Burger and Spectrum Mad Caverns and Turtles.

86 CBM-64 SNAKES: Anders Gustafsson unleashes nine screens of ophiuchan chaos, so lay off the rollmops and get stuck into some nice snake and egg.

91 FIRST BYTES: Languages, haywire programs and bluffs.

93 RESPONSE FRAME: Tim Hartnell's postbag.

95 SOFTWARE FILE: Ten pages of readers' software; fun-packed programs for most home computers, including the Atari, Amstrad, Commodore, Spectrum and ZX-81.

106 DATEBASE: Paul Bond rounds up local, national and international micro events — and supplies a list of essential phone numbers.

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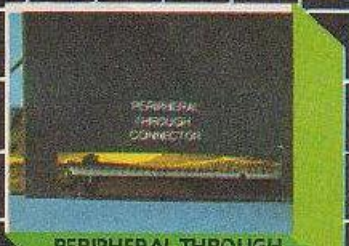

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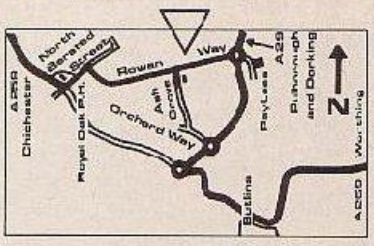

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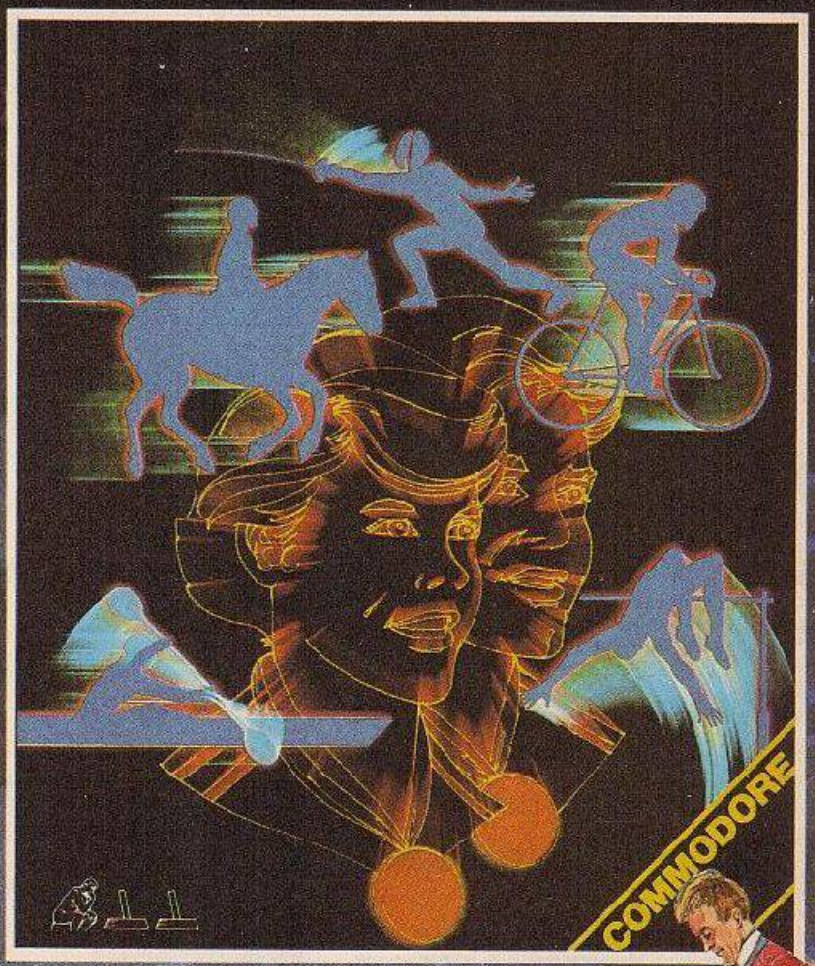

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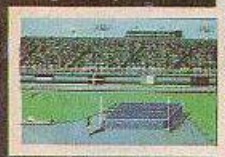

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PROSECUTING SOFTLIFTERS

EX-CHIEF SUPERINTENDENT Bob Hay, billed as the man who helped crack the Iranian Embassy siege, police the Grunwick dispute and quell Sikh unrest in Southall, now faces his toughest case. Software piracy.

He's head of the special unit set up by the Federation Against Software Theft (FAST) to root out infringers of program copyright wherever they lurk. His weapon is the tough new legislation just enacted by Parliament. It will leave software thieves open to punishment identical to the stiff crackdown that hit video pirates a couple of years ago.

If the Copyright (Computer Software) Amendment Act works out as intended, program counterfeiters — already driven out of the video industry — will have to go back to selling Mexican-built "Cartier" watches.

Although the biggest deterrents are reserved for the commercial forgers — up to two years' inside and unlimited fines — anyone selling, exhibiting or even possessing illegal copies could be stung for up to £2,000 or locked up for a maximum of two months, or both.

Thanks to the new Act and the activities of FAST the mood against petty copiers has changed. In last year's anti-piracy campaign software supremo Geoff Brown of US Gold said they should be hanged. Now that the software houses have the power of the Act at their disposal they are aware that the criminal remedy is not always the best option.

People must realise that most copying takes money away from the industry — and that will lead to a loss of software choice and a loss of jobs. In the meantime games houses will have to take whatever action they can to make petty copying as difficult as possible — using protection devices or hardware solutions like Mikro-Gen's Mikro-Plus Interface.

But until computer users become more aware of the damage that making and swapping copies does, it will continue to be a drain on the market. As former Chief Super Bob Hay puts it, the loss of money to producers and retailers is the same whether you shoplift £500 of goods or softlift £500 of games.

Let's hope for the sake of all of us who enjoy computing that the Act will be as effective as its video equivalent. Film companies estimate that video copying is down a massive 60 percent on two years ago.

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"It's OK by me." — Royal assent for piracy bill.

P-DAY FOR PIRATES

SEPTEMBER 16 is P-Day. That's the date when the tough new penalties against piracy come into force.

They are the punishment that anyone charged under the Copyright (Computer Software) Amendment Act will face.

The Act became law in July and aims to hammer all illegal copying of computer software for gain. Summary offences like selling, possessing or exhibiting illegal copies can be hit with fines up to £2,000 or two months' imprisonment or both. Indictable offences can carry up to two years' prison and unlimited fines.

Late kick-off

DESPITE ALL assurances that tough new measures would be introduced following the Brussels disaster, the football season looks like it will kick off without any computerised anti-hooligan entry card systems in place.

The Sperry identify card system, backed by former-Liverpool star Emlyn Hughes, is now no longer being pushed by the company. Sperry had a good response from soccer clubs — Chelsea signed up for a partial system and then pulled out when it was clear that it couldn't be installed in time. But there's been a complete lack of interest from the football authorities.

With the Government pushing hard for entry systems to be installed, but offering no money to help with the expense, the major stumbling block still seems to be cost.

Epson's cut-price entry.

One answer could be a low-cost system like PASS UK, Epson's identity-check scheme, based on a HX-20 portable.

ARRIVA AMIGA!

Commodore's 16-blitter

COMMODORE'S ANSWER to the Atari ST, the Amiga, looks like being the one machine everyone will want to own — if they can afford it. Like the ST the Amiga is built around the 68000 processor and has a Macintosh style operating system — written by UK company Metacompo — with icons and windows under mouse control.

Unlike its rival, the Amiga is multitasking — it can run more than one program at once. But it is the machine's graphics facility that puts the opposition in the shade. A graphics chip coupled to a high speed bit image manipulator, a blitter, allows the Amiga to draw, shift and transform shapes on screen at a much faster rate than it could with the processor alone.

You can animate figures with just a few lines of code. There are two different types of sprites and a high resolution of 600x200 with 16 colours. The graphics chip is one of the three custom chips that make all the difference to the Amiga. They also give it a very sophisticated sound capability over four channels.

The stock machine comes with a 880K 3.5in. disc drive, 128K Rom and 256K Ram expandable to 512K. When it arrives in this country it could cost as much as £1,250. On top of this owners will need to spend at least £300 more on a high res colour monitor. At these prices you might expect forthcoming software to be mainly business applications. But the graphics potential is so great that software houses are said to be equally enthusiastic about writing games for the Amiga.

Enter the Amiga.

CLIVE-PLUS IS A TV REPAIR MAN

Has Bill Jeffrey more in store for the Spectrum?

SINCLAIR sources do not deny the existence of a 128K Spectrum with a proper sound chip — the AY-38910 used in the Amstrad, MSX and so on. Meanwhile Robert Maxwell's takeover of Sinclair should be completed by the middle of this month and a new chief executive — Bill Jeffrey — to replace Sir Clive has been appointed. Hoover has still not served the writ for £1.5 million against Sir Clive which was issued a month ago in connection with the C5 electric tricycle project.

Bill Jeffrey was head of radar and navigation sales for Mars Electronics until March when he became managing director of Sinclair TV and Communications. Since then the fabled flat screen TV has at last started to appear in the shops in numbers.

Bill Jeffrey would not be specific about future plans for a 128K Spectrum or for next year's portable but he says "we have very exciting plans for the future with our existing products as well as some new ones."

Robcom's CBM-64 cartridge speed up

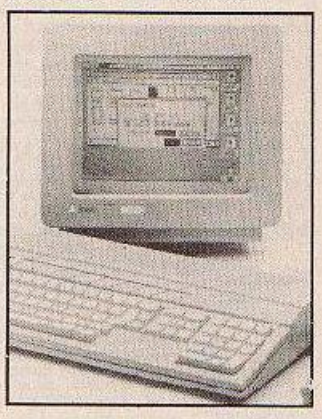
BUY A COMMODORE! On yer bike. Look, you've got to buy a Centronics interface, extra basic, a tape turboloader and a new disk filing system, I mean, that lot'll set you back nearly as much as the machine itself.

Well, not anymore. Robcom's new range of cartridges contain all this and more without even whipping any of the precious user memory. From the basic package at £24.95, right the way up to the all bells and whistles Turbo 50 at £39.95, these packages offer exceptional value for money.

Atari 260ST Tramiel's back in town

ATARI'S JACK Tramiel is returning to these shores in September with the 260ST. The same month the 520 will go on sale to the general public in a package including computer, 500K disc drive, 12 in. black and white monitor and mouse with Gem Write, Gem Paint, Atari Logo and Atari Basic for £750. Over 100 STs are already being used by software houses like Ocean, Firebird and Llamasoft as they race to be first with product for the Atari.

Jack's sprat — the 260ST.



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DIARY

SIR CLIVE'S just back from Mensa's annual bash for those who think they are geniuses. At last year's conference he predicted a world in which people would have to retire in their forties. This year he celebrated his 45th birthday with Maxwell taking over his company and Bill Jeffrey taking over his job. I hope nobody said anything about self-fulfilling prophesies.

INFOCOM who did so well with Hitch Hiker have started sending out interactive press releases. The first page congratulates you on opening the right envelope and by page 2 offers choices such as if you are patient proceed to page 3, if you are not logical proceed to page 4. 4 asks if you are really sure you should have done this before sending you to page 3 or 13. 13 just tells you off for not having any patience before sending you back to 3.

TWO OF OUR rival magazines which we will call Unclear User and Crass — have been having a little legal tangle after Crass made an unsubstantiated suggestion that User might give good reviews on the basis of which software houses placed most advertising. User sent a writ winging over to Crass which forced them to rip the offending pages out of all their issues. Fortunate for User that Imagine refugee Bruce Everiss did not force them to rip up their issues a few months earlier when User printed something about Bruce which Mr Everiss and his lawyer believed was damaging. Instead he accepted an apology and a right to reply in the next issue.

A LITTLE BIRD in a software house rings to tell me that he has been rung up by an ad rep from a magazine — not Crass or Unclear User — and offered a colour page of advertising for nearly £1,000. He refuses so the ad rep drops his price eventually to £500 but the little bird will still not book space. The rep pauses for a second then plays his trump card. "All right £450 — and we'll make your program our game of the month."

Elsie Dee

BAILING OUT

Olivetti runs the RISC

ACORN IS STILL alive and kicking thanks to another cash infusion from Olivetti and some spectacular progress from the research and development teams which has produced a cheap fast new 32-bit chip.

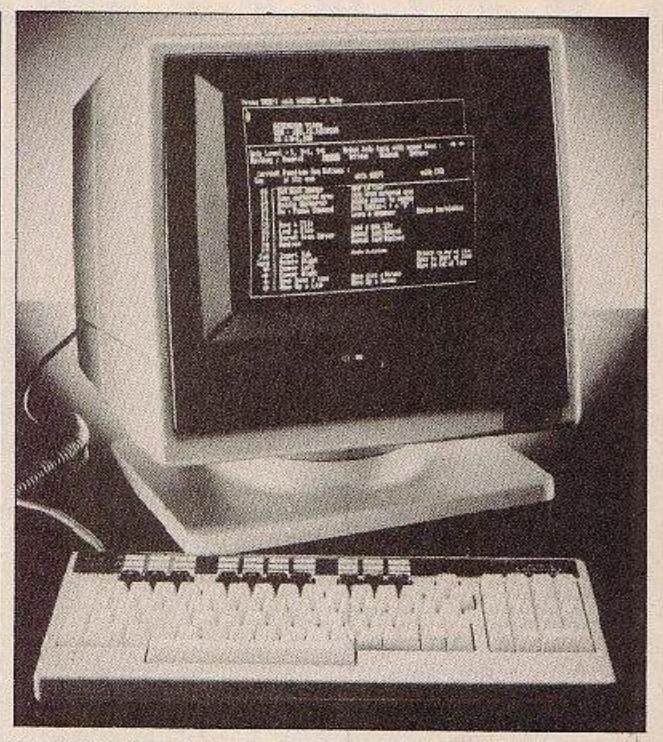
Olivetti now owns 80 percent of Acorn under a deal which has cost Olivetti £4 million, the BBC £2 million in unpaid royalties, and Acorn's other creditors £8 million in bad debts. Brian Long will now take over as managing director with Alex Uboldi helping out temporarily pushing Hermann Hauser and Chris Curry yet further down the pecking order behind Chairman Alex Reid. Brian has been recruited from the Canada Development Investment Corporation.

Meanwhile the stripped down company — down from 450 to 275 staff — has managed to launch a new work station while R&D has announced details of a Reduced Instruction Set Chip.

Companies like IBM have been racing to produce RISCs — which use a small number of instructions in combination rather than having an exhaustive list of specific operations.

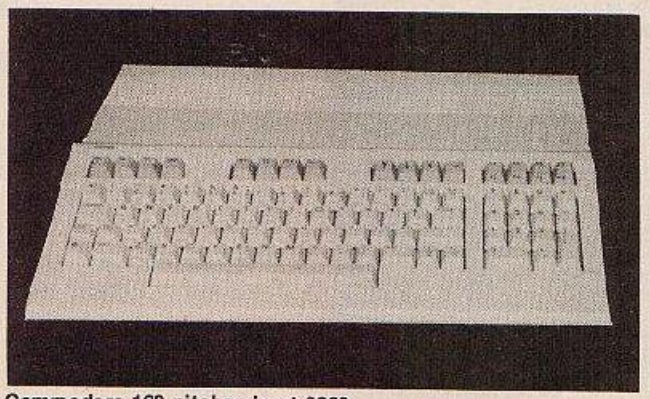
This makes the chip smaller — hence cheaper and faster than the existing 32-bit processors.

It will be some time before can incorporate the RISC technology in future models. At the moment they still hope to be able to sell BBC B Pluses at over £400 — when Amstrad can sell a complete 128K system including monitor, disc drive and printer for little more.



Workstation launch shows Acorn is back in business.

128 GUNFIGHT AT THE UK CORRAL



Commodore 128 pitches in at £269.

ENTERPRISE is finding Commodore a tough opponent in the 128K micro war. Commodore is pricing the 128 at £269 and releasing it now with a plan to spend £5 million advertising the CBM128 as the perfect machine for class of 82/83 who bought a Spectrum or CBM 64 and now want to upgrade.

Commodore is discounting fears that "clever" software which makes unorthodox use of the 64's video chips may not be fully compatible. So far few American software houses are making use of the 128 mode — preferring to write for the 3 million 64s rather than bring out specific versions for the initially small number of 128s. But the real threat to Commodore, Enterprise and Atari in the 128 stakes is the new Amstrad CPC 6128 — (exclusive review page 40) at £300 including drive and monitor.

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(Original letters available for inspection.)

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UPDATE

OLD GAMES for new, conversions are a good way for games publishers strapped for cash to make a quick buck or two. They are also nice little earners for the small software houses given the spade work of conversion whilst the original program's authors go on to pastures new.

U.S. Gold is going for the Amstrad in a big way. *Beach Head II, Pole Position, Up 'n' Down, Buck Rogers, Congo Bongo, Dambusters* and *Bounty Bob Strikes Back* are amongst the games due to have the dust knocked off them. The even older *Beach Head* is opening several new fronts on the Amstrad, BBC, Electron and Enterprise.

Following the success of the Softaid compilation, Virgin has decided to pull together a tape containing a number of titles from various software houses. Called *Now Games*, just to make sure no-one thinks they're buying a compilation LP, it contains *Lords of Midnight, Everyone's a Wally, Strangeloop, Brian Bloodaxe, The Arabian Nights* and *Falcon Patrol II*.

Virgin is promising to bring the pzazz and advertising clout normally associated with music compilations to this new venture. They may not be alone in the field for long however. U.S. Gold is also busy compiling.

Virgin has also revamped and relaunched *Sorcery*, bigger and better they say, on the Commodore, presumably with an Amstrad version hard on its heels. This follows up Software Project's successful relaunch of *Jet Set Willy* by cramming nearly twice as many rooms in it. Is this a trend other platform adventure hits will follow?

CCS has converted *Arnhem* for the Amstrad. For £9.95 you can go a bridge too far. Also Palace are bringing out *Cauldron* for the same machine. Never one to miss a bandwagon when they see one, Firebird are getting in to the conversion market with old Ultimate hits, *Underwurlde* and *Sabrewulf*, as well as revamping their Silver range to include some new Isomorphic (à la Alien 8) games.

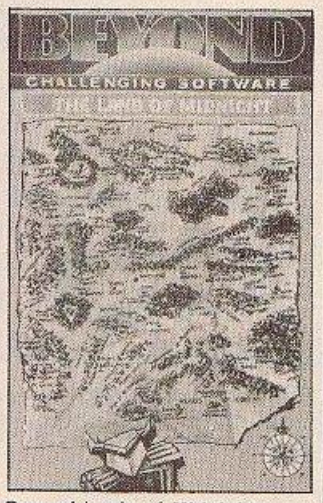
IRON HEROES

Beyond Superman at Denton

IS IT A BIRD? Is it a plane? You'll be seeing a lot of this sort of thing when First Star's Superman game is released for distribution in the UK by Beyond. But though it's a graphically strong arcade action game, Beyond are even more fired up about the home-grown products.

Sequels are well to the fore — though Eye of the Moon scheduled to retail at £9.95 on the Spectrum has been delayed. The final part of the Tolkienesque Lords of Midnight trilogy, it would have been cast more in the mould of an adventure with less emphasis on strategy.

Follow-up to icon-driven Shadowfire is called Enigmaforce and features Zark, Sylk, Maul and the lovely Serena — "We put her in because it seemed a bit one-sided otherwise," say programmers at Denton Designs. Set in a complex on Sylk's home planet, it moves beyond mere icon control, insofar as you can do a mindprobe and "become your character", going round the screen performing various tasks. Sounds like a game that could really take you out of yourself. Not bad at £9.95 on Spectrum and Commodore 64.



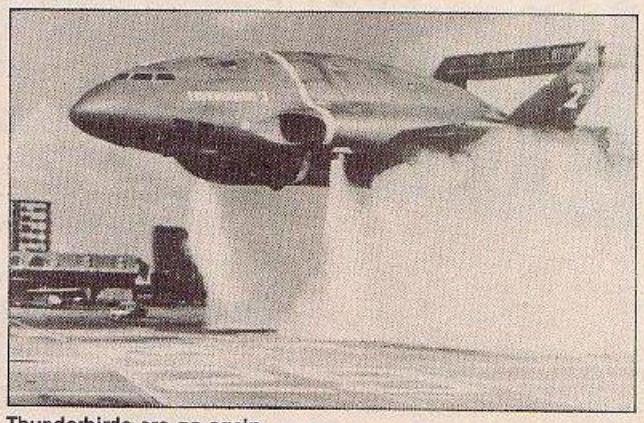
Beyond Lords of Midnight.

Liverpool trendsetters Denton are also working on a futuristic — and violent — sports game for Beyond, tentatively called Iron Heroes. "Rather than take a sport and turn it into a computer game, we took a computer game and turned it into a sport". The result, an all-action graphic game will also be out at £9.95 for Spectrum and CBM-64, this time on Beyond's new Monolith label.

Billed as a 10-hour Megathon, Quake Minus One has certainly got programmers Mike Singleton and Warren Foulkes so bogged down that Beyond have been forced to shelve long-awaited Lords of Midnight sequel Eye of the Moon. In Quake, the Robot Liberation Front demand freedom of thought and association for droids. They seize control of the Titan Undersea Power Station and hold humanity to ransom. With animated landscaping or "Actionscape", Beyond are confident that this game, along with all their new titles present techniques which will set the trend for 1986 computer games.

The game that people in the know are really excited about is Nexus, it's even got it's own label — called Nexus. So good they named it twice, this will be a graphics adventure along similar lines to Enigmaforce with digitised graphics and maximum payability.

NO STRINGS ON FIREBIRD


Thunderbirds are go again.

STAND BY for action — Firebird, British Telecom's leisure software house, has bought the rights to '60s TV puppet series Thunderbirds. The series is a favourite of Firebird supremos Herbert Wright and Phil Pratt. "It's my favourite, too", says Gerry Anderson, creator not only of Thunderbirds, but Stingray, Supercar, Fireball XL5 and, currently, Terrahawks. CRL computerised the latter in a small way — "but this is the first major one".

Filmation II the Ultimate sensation

SKELETONS with rotting flesh waiting, prowling — not Saturday night in Milton Keynes but the village of Nightshade, location of Ultimate's new "Advanced Home Computer Action Adventure Simulation". Utilising Filmation II, a technique ensuring fast smooth action, the £9.95 game for 48K Spectrum emerges along with Blackwyche for CBM-64.

Novagen's Mercenary

Freedom of choice is the keynote of Novagen's 3D vector graphic games, billed as a cross between Elite and Solo Flight. But don't let that put you off as word has it that these are some of the fastest-moving wire-frame graphics around as the mercenary searches planet Targ looking for energy crystals.

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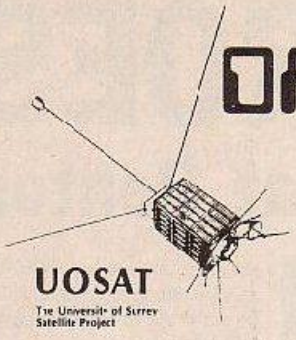

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TOP 20

1	Hyper Sports	Imagine	Sp
2	Shadow Fire	Beyond	Sp/64
3	Dun Darach	Gargoyle	Sp
4	Way of the Exploding Fist	Melbourne House	64
5	Don't buy this	Firebird	Sp
6	Cauldron	Palace	Sp
7	Grand National	Elite	Sp
8	Softaid	Ethiopia Appeal	Sp
9	Booty	Firebird	Sp
10	Arnhem	CCS	Sp
11	Desert Burner	Sparklers	Sp
12	Graham Gooche's Test Cricket	Audiogenic	64
13	The Fourth Protocol	Hutchinson	Sp
14	Nodes of Yesod	Odin	Sp
15	The Rocky Horror Show	CRL	Sp
16	World Series Baseball	Imagine	Sp
17	Quickshot	Sparklers	Sp
18	Starion	Melbourne House	Sp
19	Thing on a String	Gremlin	64
20	View to a Kill	Domark	Sp

Source: WH Smith
Sp = Spectrum: 64 = CBM 64

TOP 3 BY MACHINE

1	Rockman	M. Tronic	Vc
2	Doodlebug	M. Tronic	Vc
3	R.I.P.	M. Tronic	Vc
1	Action Biker	M. Tronic	64
2	Kikstart	M. Tronic	64
3	Way of Exploding Fist	Melbourne House	64
1	Action Biker	M. Tronic	Sp
2	Hyper Sports	Imagine	Sp
3	Fincers Keepers	M. Tronic	Sp
1	Repton	Superior	Bc
2	Lode Runner	Software Projects	Bc
3	Revs	Acorn	Bc
1	Airwolf	Elite	At
2	Drop Zone	US Gold	At
3	Bruce Lee	US Gold	At
1	Sword of Destiny	Gremlin	16
2	BMX Racers	M. Tronic	*16
3	Airwolf	Elite	16
1	Repton	Superior	El
2	Overdrive	Superior	El
3	Football Manager	Addictive	El
1	Mordons Quest	Melbourne House	Am
2	Dun Darach	Gargoyle	Am
3	Rocky Horror Show	Computer Rentals	Am
1	Fincers Keepers	M. Tronic	Ms
2	Chiller	M. Tronic	Ms
3	Crazy Golf	Mi Micro	Ms

Source: Websters Software
Vc = Vic 20: 64 = CBM 64:
Sp = Spectrum: Bc = BBC:
At = Atari: 16 = CBM 16:
El = Electron: Am = Amstrad:
Ms = MSX.

YOUR Letters

Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

"GOOD VALUE"

YOUR NEWS story in the June issue about the new Acorn BBC B+ complains at the £499 price tag but if you consider what you get for £499 it is a different matter:

BBC Micro Model B	£330
Aries B20 Board	£100
Rom Expansion Board	£ 55
Acorn DFNS 1.2	£100
TOTAL	£585

Your basic BBC B has five Rom slots of 16K each, whereas the BBC B+ has six Rom slots of 32K each giving an extra 112K of Rom space! However in the BBC B you loose two 16K Rom slots for the Basic and O.S. Roms leaving you with only 48K of Rom space. In the BBC B+ you loose one 32K Rom slot leaving you with 160K of Rom space! Secondly, the DFS is the new 2.1 version with a 1770 controller chip. There is also an extra 12K of Ram spare which nobody at Acorn can decide what to do with, but no doubt somebody will find a use for it.

Buying a BBC+ saves you £85 on the price of upgrading a BBC B. This must be considered a bargain and not, as one reviewer claimed, £170 for an extra 32K Ram. I give it an A+ not a D−!

Chris Armes,
Stockport,
Cheshire.

MICRONETTING

I RECENTLY won a Prism VTX 5000 Modem in a competition organised by British Telecom. Since then the strings of G.T's Micronet 800 have been slowly but relentlessly closing around me.

It is true that by using the downloader program published in *Your Computer* I have been able to receive a number of excellent programs on your Telsoft service. But where do we go from there? To download six programs took less than an hour, even though it was spread over two days because of the staggered transmission times. Now I can expect, at most, two or three new programs each month from Telsoft. This would mean that the modem was used for about five or six hours each year.

So why not join Micronet 800? "One pound a month and the cost of a local telephone call" is B.T.'s advertising slogan. What is not mentioned is the fact that you must take out a year's subscription which is subject to V.A.T. As a youngster, some years ago, I was persuaded by a man on the local market into paying half-a-crown for an envelope into which I had seen him place a gold watch. It turned out that my envelope contained a packet of razor blades worth six old pence. Since then I have been very wary of people who want to sell me something without letting me see it first, particularly when it is going to cost me £59.80 plus telephone charges.

So who needs Micronet 800 when there are all those independent bulletin boards waiting to welcome me? Surely the VTX 5000 instruction manual would give me the information I required? Oh dear! The manual deals exclusively with accessing Micronet 800. The answer was obviously to write to Prism and ask for more details. Just to be sure I also wrote to the firm Modem House who were advertising user to user and bulletin board software for the VTX 5000. The day after sending the letters I read that both the manufacturers of the modem and Prism were defunct and that Modem House had taken over the distribution. So what arrived through the post from Modem House? Yes, you guessed it, more advertising material for Micronet 800.

A visit to the local library provided a list of bulletin board telephone numbers and the disturbing information that most of them operated on a 300/300 baud system. The VTX 5000 operates on a 1200/75 system. I also found that I would need special software and would in some cases have to pay to access the 1200/75 system that existed. What is more most of these operators seemed to be located at the other end of the country. What price the "cost of a local call"?

R. Houlton,
St. Helens,
Merseyside.

"QL IS OK"

HAVING JUST READ the July edition of *Your Computer*, and flicked the pages to the Atari review, I have a question to ask. Quite simply it is: Why does Kathleen Peel despise the QL? Since this excellent machine appeared on the market, she has been giving the machine a hell of a slating. In any reviews or comparisons of machines in your magazine, I have always been impressed by how fair the writer has been in picking out the good points, but also the bad ones. Kathleen Peel, however, seems to be extremely happy to pick out only the bad points of the QL. For example, in the review in the July 1984 edition:

"... loading times, these figures are in no way good enough". "There are a number of notable omissions from the list of keywords, the ones I found most irritating were On Error and Rename". "The output was extremely difficult to format ..."

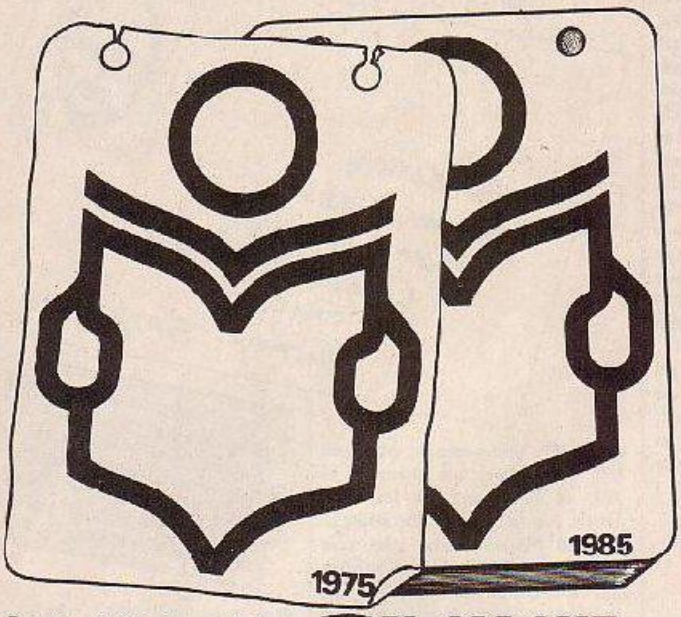
The list could go on and on, but these are just three. I have chosen at random. In the Microdrive loading times section, she said that the Microdrives were just not comparable with disc drives. This is a rather stupid statement as Microdrives are only designed to load and save programs faster than cassette! All "tape drives" are slower than discs! As for the omissions of the two keywords, all I can say is "so what?". I use a Beeb at school for my A level computer science course, and I have only used "On Error" a handful of times and "Rename" only once. Their omission from the machine appears to me as being no great loss.

In the Atari review, she says in the Opposition box: "Adequate software". "Adding a black and white monitor and 512K Ram expansion takes you up to £800". "On that basis, not worth thinking about".

Good God! She rates machines such as the IBM PC, Apple Macintosh and Apricot FII higher than the QL! How on earth can you compare a £400 machine with those costing over £600! OK, I admit it, I myself think the Atari ST range will be tough competition, but it has taken Uncle Clive's QL to give the computer industry the kick in the groin needed to get home computers out of the old 8-bit forest. Let's all face it, if the QL had been an 8-bit machine, the new STs and the Commodore Amiga would probably be

(continued on page 21)

Adult Literacy
-the first decade



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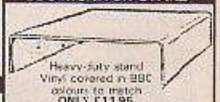

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VISA

IN ★ TOUCH

How to write for *Your Computer*

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Telsoft

Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

Message service

You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+++ STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 19)

8-bitters also. I do not as yet own a QL, but I am considering it among a list of others, and so far it is top of the list.

What I would like to read now is Kathleen Peel's review of the BBC B+. Almost certainly it would be along the lines of "excellent value for your £500, On Error and Rename commands supplied, 54K Ram, built in DFS".

It would probably not mention the fact that at £399 the existing BBC B is considered over-priced, nor the fact that the machine is still 8-bit, nor the fact that some existing disc-based games may not run because of a difference in the chips used.

If it weren't for Uncle Clive and his innovations, we'd all be sitting out here waiting eagerly for the sixteenth "–" version of our 8-bit machines, wishing someone would be brave and go into 16 or 32 bits for a change . . .

Colin Grant,
Newcastle upon Tyne.

YOUR Letters

HATCHED FILL

THE HATCH FILL routine for the Spectrum, in the August issue of *Your Computer* by A.J. Renton, is a very useful routine. I would like to point out that it is not necessary to use the first User Defined Graphic each time.

The routine uses the byte value at address 23675 which points to the first UDG — see manual — and is normally set at 88. By Poking this address with another value the routine can be made to use any of the UDGs. The value Poked needs to be divisible by eight to capture the first byte of the UDG but intermediate values may be Poked to vary the choice of patterns. For example

POKE 23675,93

will produce a hatched pattern using the last three bytes of graphic "A" and the first five bytes of graphic "B".

Extra patterns can be produced by calling the routine more than once with 23675 Poked with different values each time. As an extra bonus any eight byte sequence in the Spectrum memory can be printed as a pattern by Poking 23675 and 23676 with suitable values to point at the required address.

To avoid complications reset the variable area to normal when not using the Hatch routine, i.e.

POKE 23675, 88: POKE 23676, 255.

Keith Selby,
Old Coulsdon,
Surrey.

SPRITE DESIGN

IN R. Newman's Spectrum Sprites program that appeared in the June 1985 issue of *Your Computer*, there is a sprite designing program. Unfortunately, due to the use of the In command, it has been rendered unusable by model 3 owners. Up until now that is. The secret is to take 64 from any In results. Therefore to alter the sprite designer to run on a model 3 Spectrum.

Line	Appears in Frog as:	Change to
3060	255	191
3065	251	187
3060	251	187
3080	243	179
3080	235	171
3085	254	190
3090	239	175
3100	251	187
3105	247	183
3110	239	175
3115	243	179
3120	235	171

For example:

3100 If a = 251 THEN LET X2=X1+(X1 15) should be

3100 If a = 187 THEN LET X2=X1+(X1 15)

Jon Ross,
Bognor Regis,
Sussex.

A CHILDS' VIEW OF LOOPING THE LOOP

I SIMPLY cannot let Geoffrey Childs' letter in the July issue stand uncorrected.

The first thing that a beginner should learn about loops is that you should not jump into them. Jumping out of them is not only legal but often necessary, as when searching an array for some target element.

It is true that many versions of Basic cause problems when one jumps out of a loop. However, this is a bug in Basic — see my article, "A Bug in Basic", which appeared in the American magazine *BYTE*, January 1981. It is not in Fortran, Pascal, C or other higher-level languages.

The line L = 10 which Childs cites is a line which, although it is allowed in Basic — which does not check such things — violates a rule of almost every other higher level language; namely, that in a loop for "variable" from "minimum" to "maximum" one must not change the values of either "variable" or "maximum" inside the loop; if one does, then unpredictable behaviour may result.

If you have a version of Basic with the bug, the best way to avoid it is to "write out" your For loops without the For statement. That is, instead of

```
For I=M TO N:code:NEXT I,
```

write

```
I=M:"label" code:I=I+1:IF
  I<=N THEN "label".
```

Instead of

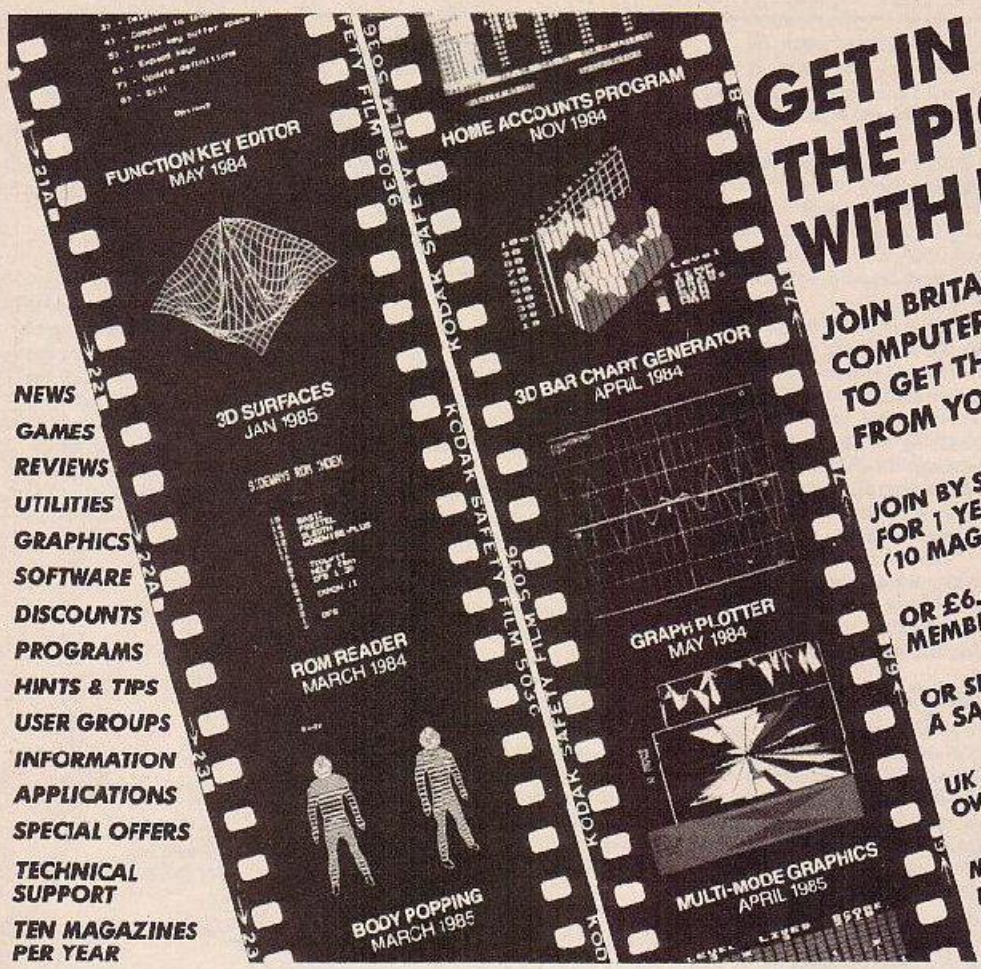
```
FOR I=M TO N STEP J:code:
        NEXT I
```

write

```
I=M:"label" code: I=I+J:IF
  I<=THEN "label".
```

It's true that if you do this you are using an extra Goto statement. But if you're avoiding Goto statement, use Pascal in the first place, or Simons Basic.

Douglas Maurer,
George Washington University,
USA.



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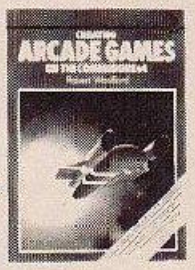

Now you can learn how arcade games are created from scratch. Step-by-step, in easy-to-understand detail, commercial software developer Robert Woolford lets you into the secrets of the professionals.

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The book also includes a fully annotated, complete arcade game listing.

Creating Arcade Games on the Commodore 64 by Robert Woolford (ISBN 0 907563 75 9) is £7.95, and is available at most book and computer stores, or directly from the publishers, post free:

Interface Publications Ltd., Dept YC,
9-11 Kensington High Street,
London W8 5NP
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Interface

Star chart

KEY

★★★★★ Best of its type
★★★★ Very good
★★★ Good
★★ Average
★ Below par

Frankie Goes To Hollywood

CBM-64
Ocean
Adventure
£9.95

★★★★★

Extensively previewed in our June issue, the game has deigned to come on to the market at last, but it's just as good and revolutionary as when we raved about it last time. You have to solve a murder mystery and strive to become a complete person. The music is excellent and the use of window graphics is superb. Frankie Goes To Hollywood may be last year's model as a band, but the game will definitely run and run.

Repton

BBC
Superior Software
Arcade Adventure
£9.95

★★★

Just as every Western is said to be a variation on one of seven basic plots, so new computer games usually just ring the changes on a handful of familiar game concepts. Repton is a case in point. It contains elements of Dig-Dug, Boulderdash, and maze games, wrapped up in an arcade adventure format.

The game is also on an impressively large scale. There are 12 levels and on each the screen scrolls in four directions over an area 16 times it size. You have to tunnel through the earth collecting diamonds. But as you do so you dislodge boulders which invariably tumble down to trap you or seal off a vital passage.

Fortunately at any point in the game you can consult a map.

All these features add up to produce a highly playable game.

SOFTWARE Shortlist

Mig Alley Ace

- *CBM-64*
- *U.S. Gold*
- *Simulator*
- *£15*

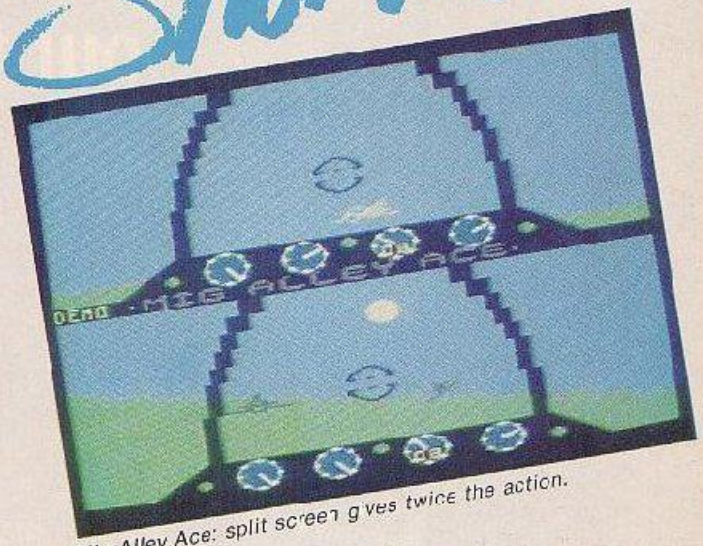
★★★★★

THERE'S ONLY one thing better than blowing away a computer-controlled plane and that's blowing away a plane controlled by a human opponent. Introduce the element of competition in a computer game, and you're on to a winner. No more arguments about high scores made at one in the morning after five hours play, in Mig Alley Ace reputations are made where it counts: head to head.

The game is all about air combat over Korea. The name comes from the area between the Yalu river and the 38th parallel; it was a place where a pilot picked his fights carefully, if you didn't like the odds, you get the hell out, at least the pilots that survived did.

In the game, the screen is split into two, each half giving an out of the cockpit view with some rudimentary instruments. Each player uses a joystick to control his aircraft, plus keyboard controls for throttle and bail out.

There are three different ways you can play the game: single player for practice, two player co-operative or head to head. You can add computer controlled aircraft to taste: if you're feeling sadistic you can gang up on the computer two to one. After you've decided the sides, there are five scenarios to choose from including choosing bombers, fighters or transports, altitude, night or day.



Mig Alley Ace: split screen gives twice the action.

Each side starts off with three lives, which are lost if you crash, get shot down or bail out unsuccessfully. You get points for planes shot down depending on the difficulty level you set yourself: the harder the task, the more points you get. So much for the bald facts, what's it like to play? My favourite is head to head with an extra computer controlled wingman each.

The game makes no pretence of simulating flying a Sabre or Mig, it concentrates on the all-important matter of getting your opponent in your sights and keeping him there long enough to blow him away. Whilst not detailed, it is superbly accurate. From tight turning on the edge of a stall to aiming off with your cannon to allow for gravity and the enemy's movement.

It's unfortunate that player one can only operate his throttle if player two is prepared to let go of his joystick.

Another problem is getting used to the way other planes are displayed. This is fairly rudimentary and is based on their respective ranges and attitudes.

This is a game that will instantly appeal to the simulator buff. For the novice, it's going to be a rough, one-way ride to oblivion, at least to start with. But persevere, and find out if you've got "the right stuff".

. . . BEHIND THE SCREENS . . . BEHIND THE SCREENS

IF YOU'RE LOOKING for a flight simulator, then look no further than Microprose. A small outfit set up two years ago, they've built up a solid reputation under the driving force of ex-fighter pilot "Wild Bill" Stealey and now have over eight per cent of the U.S. market.

Andy Hollis met Bill when they both worked for General Instrument Corporation and, soon after Bill formed the company with Sid Meyer, Andy started moonlighting for the company, working on Mig Alley for the Atari. "I first got interested in computers at college whilst majoring in mathematics. I got an Atari video console and really got hooked on Breakout. It's been downhill ever since. Mig Alley was always a compromise between realism and playability.

"I wanted it to be fun to play but still make the fighters handle accurately. I used plenty of ideas from Sid Meyer and his work on Hellcat Ace."

Andy Hollis: "It's been downhill ever since."

But Mig Alley was a far greater challenge — over three times as much mathematics was required to get the planes moving relative to one another. "My current favourite game is the one I'm working on right now. It's called Gunship. I really don't get much time to fool around with the other stuff that's on the market." Gunship promises to break new ground in simulator graphics with realistic motion of buildings as you skim along the tree tops.

Andy wouldn't reveal if he'd ever succeeded in shooting down his fighter pilot boss but then it pays to let your company president win now and again.

Lee Paddon

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Star chart

Southern Belle

Spectrum 48K
Hewson Consultants
Simulator
£7.95

★ ★ ★ ★

The golden age of steam is dragged kicking and screaming into the digital age of the micro. All aboard, the whistle blows, and the mighty Southern Belle pulls out of Victoria on its way to Brighton with you at the controls.

You take the part of an engineer, with the computer holding your hand to start off with; as your confidence grows, you can take on harder and harder runs, and use more of the controls. What will make this game a huge hit with the steam fraternity is the "chrome", with perspective line drawings of all major trackside features. Unique idea, superbly executed.

War Zone

Amstrad
CCS
Wargame
£7.95

★ ★ ★

Capable conversion of the Spectrum game, abstract war game, you versus computer with artillery, tanks and infantry. Move, fire and melee in an attempt to invade the enemy heartland before he does the same to you.

April Showers

BBC
Bevan Technology
Dodge about
£2.50

★ ★ ★

You are a cloud — well, why not. Your task for the day is to avoid evaporating by crashing into other clouds and raindrops, whilst keeping a delicate little bloom from wilting under the barrage of the hot sun and hordes of umbrellas. If you manage to fend off the offending umbrellas, on to the next day. The graphics are colourful with some nice touches, like the pair of eyes in the cloud which look in the direction it's moving.

SOFTWARE Shortlist

Beach-head II

- *CBM-64*
- *US Gold*
- *Combat simulation*
- *£14.95*

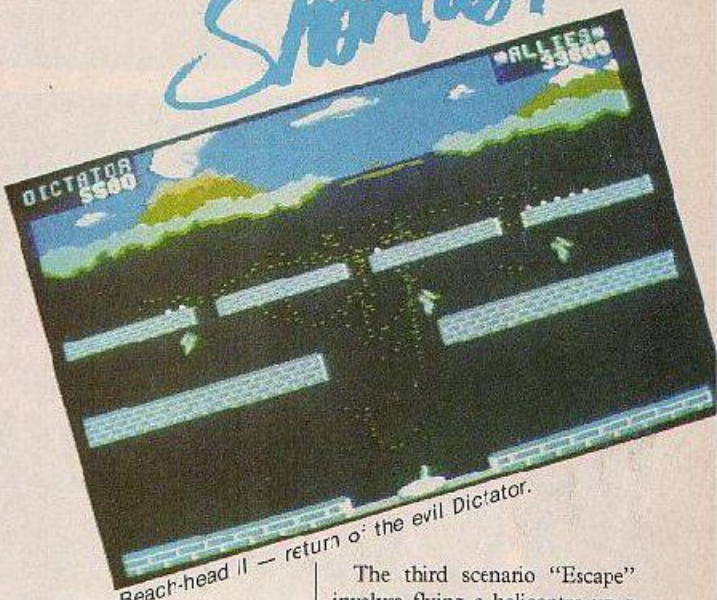
★ ★ ★

STORIES FOR BOYS — in the tradition of War Picture Library comic books, the soldiers in this follow-up to US Gold's blockbuster Beach-head cry "Argh!", "I'm hit!" and "Medic!" when they get blown away.

Beach-head II is a two-player game, which you can play against another human, or the computer.

The first scenario, "Attack", pits a detachment of chopper-borne paratroops versus the dictator's machine gun emplacement. If you are in command of the attacking force, you start off controlling the helicopter. Make sure you don't come in too low, or you'll kill your troops when you drop them — this is done by pressing the fire-button. They hide behind a wall with three gaps in it. Both sides of the gaps flash periodically, and if you hit the fire-button, troops move out in pairs from that side. Usually one soldier seems to be under your control, while the other has a mind of his own, and acts as a decoy.

One man may throw himself over the second wall while another emerges from the sole central gap in this wall to make a frontal assault with hand grenades.



Beach-head II — return of the evil Dictator.

In the second scenario, "Rescue", some pretty bizarre things appear to be going on, but basically, if you were in control of the troops before, you should now have control of the machine gun emplacement. Your job is to cover your hostages as they escape from the Dictator's fortress.

The third scenario "Escape" involves flying a helicopter up a roadway with things firing at you.

An enjoyable game which should keep the kids away from tearing the legs off insects or teaching the cat to fly, but for my money the first scenario is the one which will get played most. £14.95 on disc, £9.95 on cassette.

Paul Bond

Great American Cross Country Road Race

- *CBM-64*
- *Activision*
- *Road racing*
- *£9.95*

★ ★ ★

THIS MAY BE THE computer game with the longest name in the world. It may be, as one American newspaper has it "Cannonball Run on a Home computer". Burt Reynolds may have his doubts. At first glance the main game is a little like Audiogenic's Talladega. But there is plenty of geographical and chronological variation — it gets darker as the day wears on, and some nice additions.

You can, for example, race from San Francisco to Washington, Los Angeles to New York, Seattle to Miami, or there is even a U.S. tour. Once you have selected a route the map screen pops up, allowing you to check where you're going and what the weather is going to be like. So if you drive up on the Range, Minnesota way, you tend to get snow, but other scenarios take you through desert and plains.

Longest race: longest name.

You have a certain amount of time to complete each leg of a race. If you go too fast you attract the attention of the highway patrol and get flagged down. Also you must keep your eye on the gear shift: as the RPM increases, the car's engine whine gets higher — if you let the tachometer reading get too high without slowing down and shifting gears — the engine blows, and you have to "push" it to the next gas station, using the fire button.

The facility to down-load games so that you can build up a file of fields to race against is a nice touch. A nasty touch is that it's very easy to drive past gas stations you really wanted to stop at. People playing the forthcoming European Road Race from the same company will doubtless have a "Sacre bleu!" option for this eventuality.

Paul Bond

Juggernaut

- *Spectrum*
- *CRL*
- *Truck simulator*
- *£7.95*

★ ★ ★

TIME TO dig out them Faron Young records and settle down to a little silicon truckin' on the Spectrum. Believe it or not this is an articulated lorry simulator. Better yet, it's icon-driven.

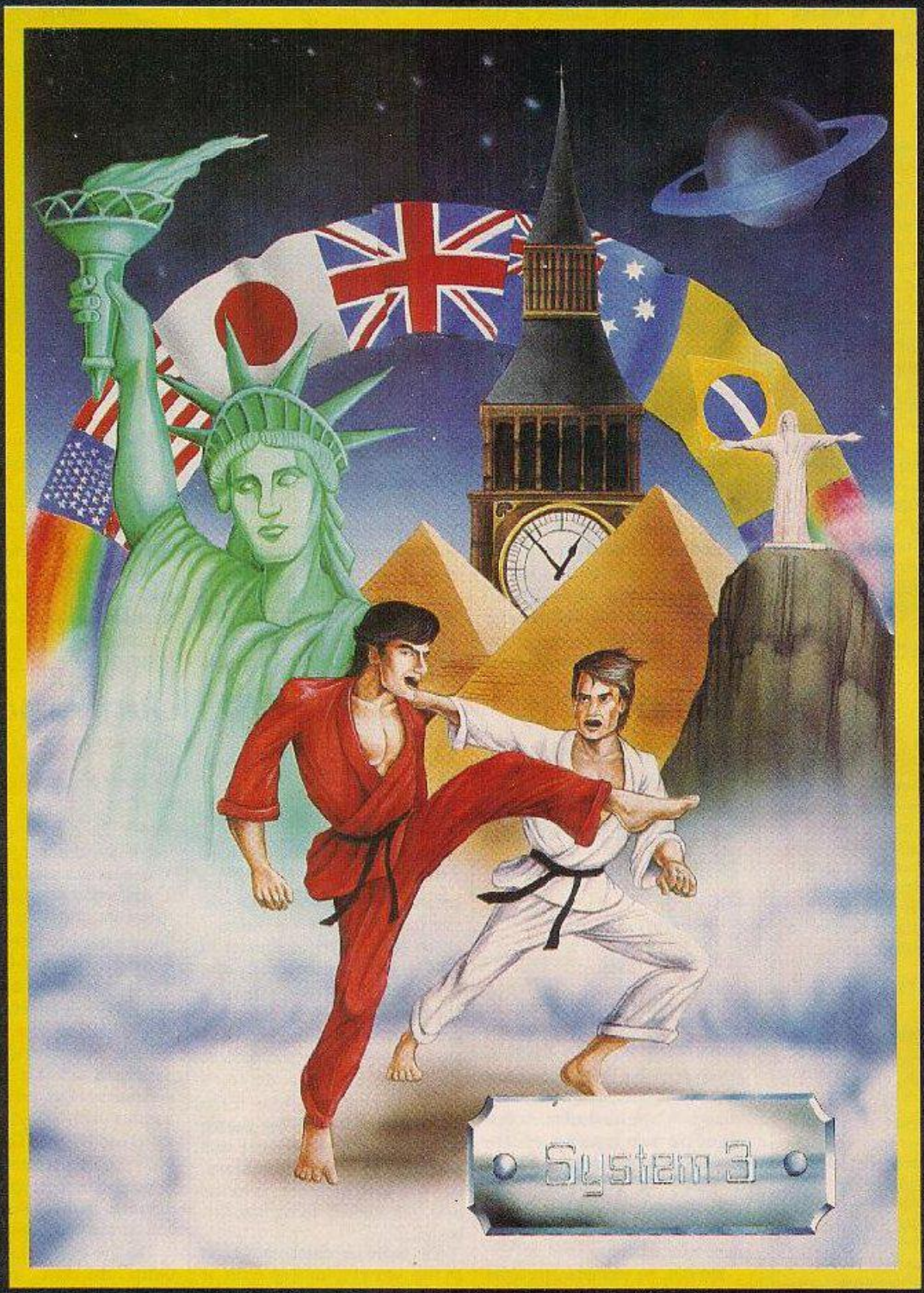
The entry screen is divided into two sections — driving information at the top and five icons at the bottom. The driving display has dashboard data like fuel, speed, distance travelled and time elapsed, together with a stylised steering wheel and joystick. There are some traffic lights represented here, too — points are given against you for jumping traffic lights, speeding and damage done to the lorry.

The five icons enable you to re-define the keys, see hi-score, practice, change the size of your lorry or just drive.

A nice idea, could have been more smoothly implemented for this price, and a third and a fourth gear would have made it a useful driving simulator. But still, loads of fun, so keep on trucking, CRL.

Paul Bond

INTERNATIONAL KARATE



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Star chart

3D Voice Chess

Amstrad
CP Software
Chess Game
£12.95

★ ★ ★

Amstrad conversion of successful Spectrum game, this version also features "speech" and a 3D perspective view of the game like the recent Psion QL chess game. After you've turned the sound down to get rid of the speech, it plays a competent, if rather uninspired game. Book openings, hints and editing are available with seven levels of play.

Grand Prix Rally II

Amstrad
Amsoft
Motor racing
£8.95

★ ★

On a planet long ago lived a race of people so amazingly primitive they thought Pole Position was a really neat game. Well, this is worse. Take Pole Position, throw out most of the scenery, most of the cars, the smooth scrolling and the time/speed display and you get the idea of this one. Only for those sincerely desperate to burn some rubber on their Amstrad. One shudders to think what the first bite at the cherry must have been like.

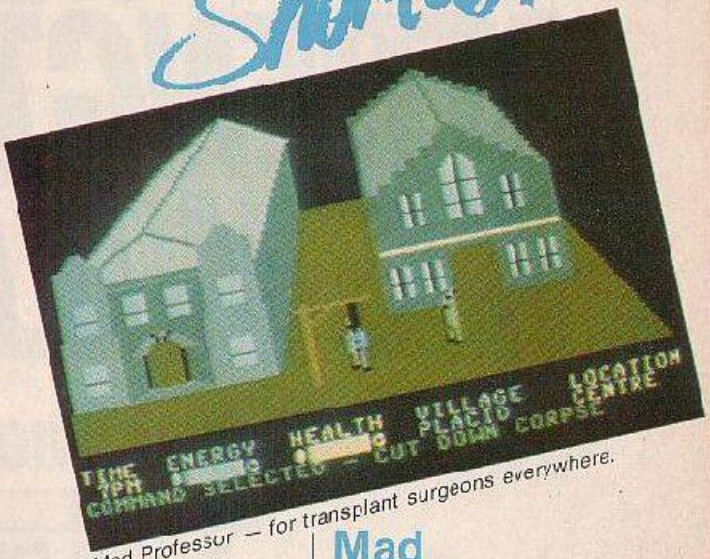
Cryptamania

BBC B
Black Knight
Arcade type adventure
£6.95

★ ★

Armed with a laser, you traverse a crypt's tight-fitting passages in search of four keys to freedom. However, there are more complex crypts and hideous nasties beyond which they'll try their best to hinder you. The graphics are clear but simple and a little originality would have helped, but interesting to play if only to find out what's in the next crypt.

SOFTWARE Shortlist



Mad Professor — for transplant surgeons everywhere.

Rocco

- *Spectrum*
- *Gremlin Graphics*
- *Boxing simulation*
- *£7.95*

★ ★ ★

"I COULD HAVE been a contender!": you may feel tempted to echo Marlon Brando's words in *On the Waterfront* as you stumble bloodied but unbowed away from the keyboard.

Not exactly good clean fun, Rocco consists of punching four different boxers in your struggle to become champion of the world. The graphics are excellent, even if it is a little disturbing to see this sort of thing portrayed in such gruesome detail. However, this game is certainly a feather in Gremlin Graphics' cap.

The game, originally produced by Dinamic Software, has fallen foul of Sylvester Stallone insofar as it was originally named Rocky — but you don't argue with copyright or Rambo, it would seem.

To beat your opponent, you must knock him down three times. So much simpler than the comparable Frank Bruno game and much more satisfyingly brutal for those used to having large amounts of sand kicked in their faces.

Paul Bond

Rocco: Don't mess with Rocky.

Frank Bruno's Boxing

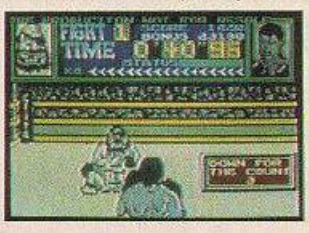
- *CBM-64*
- *Elite Systems*
- *Sport simulation*
- *£6.95*

★ ★ ★

YOU CAN DUCK, dodge left, dodge right as well as landing right and left punches on your opponent's jaw. When the KO sign is flashing you can land a right hook/uppercut depending on whether your guard is up or down. Whether you make body blows or head blows is determined in the same way.

All of which makes Frank Bruno's boxing technically a more sophisticated game than Rocco, the other contender in the boxing stakes this month. If you win the bout you get a secret code which enables you to go on and load in the next boxer. You have to take on eight boxers as opposed to the four in Gremlin's Rocco in order to become heavyweight champion of the world. Each of the boxers has a different fighting style.

Frank Bruno: Well, Harry . . .



Yet somehow the game doesn't succeed graphically in the way Rocco does. Punches don't produce the same squelching effect on your opponent, and your first opponent the Canadian Crusher, could be anything from a gorilla to a barrage balloon.

The screen is divided into two main sections. The upper half shows fight time, score and bonus — together with Bruno's status. The lower half shows a perspective view of the ring. It's fairly easy to defeat the Canadian Crusher, sometimes you can knock him out with just left and right jabs. I'm not totally convinced about the difference between head blows and body blows. It seems to be largely a random piece of luck if your blows have any effect.

The eight boxers are all fantasy characters laden with boring old national stereotyping. Ravioli Mafioso (Italy) knows all the dirty tricks and uses them without a care in the world. That's not going to endear us to any computer users in Turin, is it?

Paul Bond

Mad Professor

- *CBM-64*
- *Creative Sparks*
- *Arcade adventure*
- *£7.95*

★ ★ ★

THIS IS AN adventure game for people who hate adventure games. You don't have to key in a wide variety of commands only to be told that you died of hunger and thirst while still on the first screen. By pushing the joystick forward and back you scroll through the commands necessary to the particular part of the scenario that you are inhabiting. Push the joystick left and press the fire button to execute the command. You'd have to be a real dummy to die on the first screen of this game. The graphics may not be exactly luxurious, but they're a passable 3-D.

You wake up in your castle, Schloss Strudelberg — where you as Franz Johann Blockenspiel the Mad Doctor are free to carry on with your gruesome hobby, reanimation of dead tissue with a view to constructing an artificial human.

There is a map screen showing the layout of the village near your castle: there are six main areas; the castle, the dwellings, Lightning Hill — a good place to zap some energy into your necro-android — the village centre near the police station, the forest and the graveyard.

The aim of the game is obviously fairly unpleasant. Of course you can construct a fair amount of your creature from dead

(continued on page 29)

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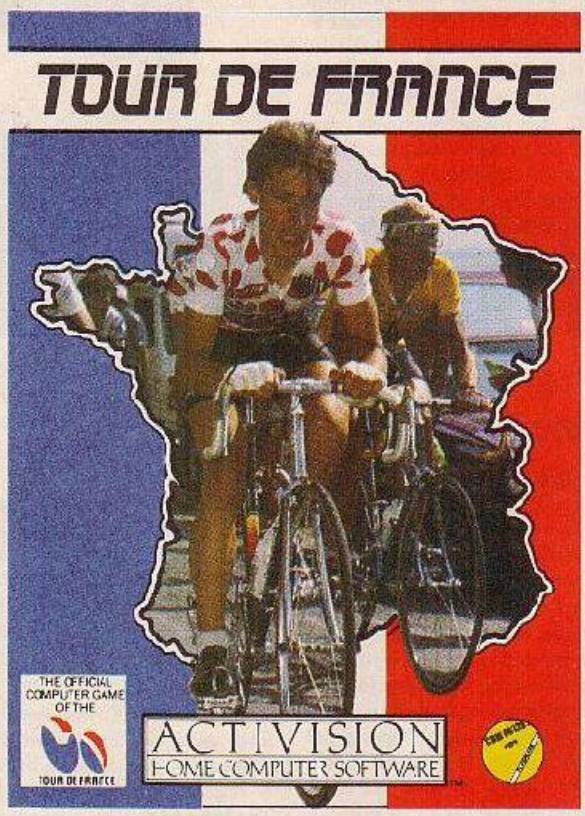

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Star chart

Confidential

Spectrum
Radar Games
£6.95

★ ★ ★

Another Quilled adventure, Confidential casts you in the role of a private investigator in a small coastal town.

The adventure has some neat touches. The persistent ringing tone in your office — the Craig Adams Detective Agency — at the start of the game is one. Others include the attractively presented text, with use of some smal graphics, and the inclusion of a detailed street map.

You are called out to the home of a woman who badly needs your assistance. Getting there is not too difficult provided you don't try to walk the eight or so miles. Once you've arrived at the distraught lady's house, you'll discover that this is going to be a search for a missing husband.

An enjoyable adventure but not an easy game to solve.

St Crippens

Spectrum
Sparklers
Adventure
£2.50

★ ★ ★

Value for money from Creative Sparks again. Their low price good-quality software range now includes a game which might be interpreted as a searing indictment of the effect of government cuts on hospitals. So bad are things at St Crippens that you would rather escape from the hospital than risk treatment. Pursued by nurses, matrons, porters and even creatures from the genetic engineering lab, you must find your clothes so you can slip past the security guards.

Contact with the staff and patients gradually debilitates you to the point where you end up on crutches. Then you die. Simple but well-executed graphics, and dashed tricky to play using the cursor keys.

(continued from page 27)

bodies, hanged men and so on, but sooner or later you will have to knock someone off, take them back to the schloss and dismember them. You can't use too many parts from the same dead body or the resultant thing will be uncontrollable. Best not to knock someone off in a crowded pub because the villagers will attack.

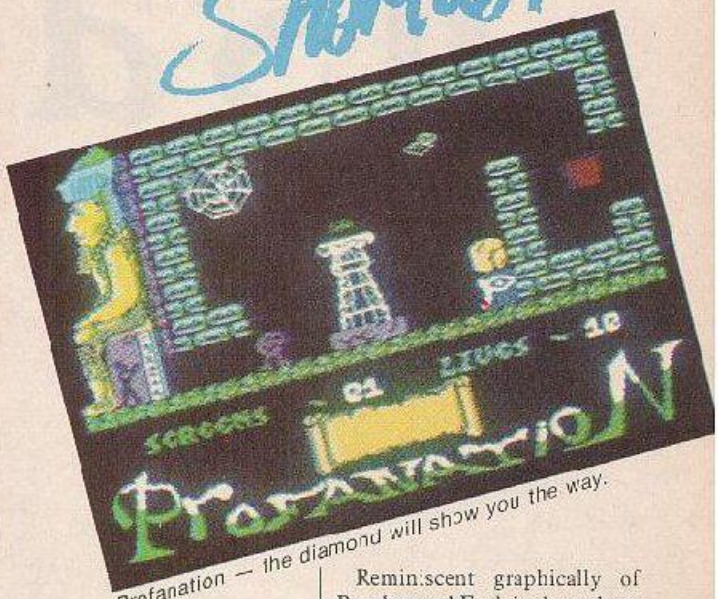
You steer your character around the screen using the joystick, and if you are in a position to attack a villager, the relevant command will appear and if you think it is wise you can start in on a little mayhem. Then you will find it easy to get the command "carry body" and thence back to the castle for a little home surgery. Best to use the underground passage way — there's one from the castle to the pub, for example, otherwise the villagers will cease to be placid.

One you've got your cadaver together and energised it, you present it to the people at the village hall. If you're lucky, the villagers will have about the thing from the grave and hail you as genius. If they don't dig it, they'll bury you. The game has a potentially monstrous appeal and will be enjoyed by transplant surgeons everywhere.

Paul Bond

Mad Prof: a little home surgery.

SOFTWARE Shortlist



Profanation — the diamond will show you the way.

Profanation

- *Spectrum*
- *Gremlin Graphics*
- *Arcade adventure*
- *£7.95*

★ ★ ★

PROFANATION IS certainly the name of the game here, since the idea of easing you into the game gently is not the idea. So you will be tempted to use all sorts of naughty words as you signally fail to get your little purple blob to jump past the acid drip on the first screen.

Reminiscent graphically of Bugaboo and Fred, both products of those immortal Spaniards Paco and Paco, and with names like Victor Ruiz, Florentine Petrejo, Santiago, Morga B and Snacho on the credits list, we leave you to draw your own conclusions, i.e. they have nothing to do with Paco e Paco except being Spanish. You have to discover the secret of Abu Simbel, the ancient Egyptian temple and free Johnny Jones from the spell.

Since this is just about the most fiendishly difficult platform-style game that you are ever going to meet, or want to meet, you will be doing an awful lot of tooth-gritting. You have to learn that you don't need to stand vertically on top of objects. Wait, calculate and think before you act, hints the program at the beginning — it also hints that "The diamond will show you the way".

This means that on one of the screens there is a diamond. You should note the colour of the gem as at another point in the game you will encounter a screen with five coloured squares on it. You must touch the square that is the same colour as the diamond if you want to progress further. Otherwise things get very profane indeed.

Graphics are pleasantly executed — as you yourself are from time to time — and the purple blob which is Johnny Jones has a whimsical way of looking around and grinning while waiting for the next move. Could be a distant relative of Roland Rat. All in all, one of the best tombs I've ever had to work in.

Paul Bond

(continued on page 31)

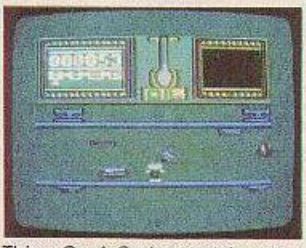
Thing On A Spring

- *CBM-64*
- *Gremlin Graphics*
- *Arcade adventure*
- *£7.95*

★ ★ ★

A REALLY PROMISING program from Gremlin Graphics, showing that with or without Tony Crowther they are capable of still coming up with the goods — maybe not great innovation but still a game that is pleasant to look at and absorbing to play.

Since the Evil Goblin is housing things up as per usual, our hero — Thing On A Spring — has hopped into the enemy's underground factory to save the world. An appealing little fellow, he has to bounce on and off various platforms and conveyor belts to achieve his goal. But this is no simple platform game-cum-shoot-'em-up.



Thing On A Spring: catchy tune, now catch the goblin.

In order to use certain parts of the screen, you must first acquire the five control boxes. These take the form of little parcels lying about in fairly inaccessible places.

Apart from this, there are nine pieces of jigsaw to collect. When assembled, these provide the vital clue to the extinction of the aforesaid Evil Goblin.

There are four floors to work through and by the end of the game you should know how to trap the Evil Goblin. Either way the catchy musical soundtrack will be firmly embedded in your brain.

Paul Bond

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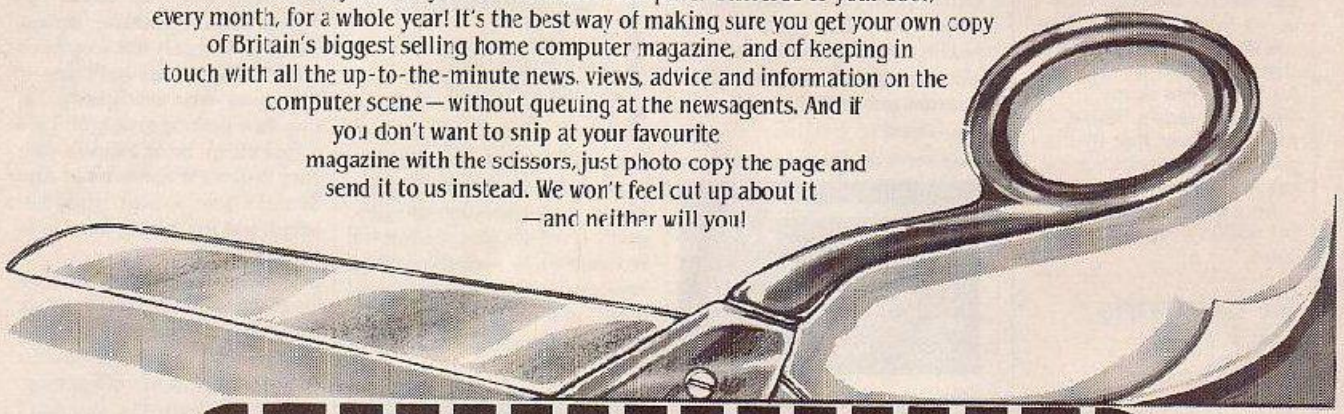

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YOUR COMPUTER

Star chart

Paws

Spectrum
Artic
Maze game
£7.95

★ ★ ★

Just when you thought it was safe to change the cat tray — Artic have come back into the games market. In this setting of feline ferocity, you as the top cat have to get all your kittens together before the local dogs attempt a final solution to the catewauling problem. So you scour the maze looking for the little ones and battling with any dogs you encounter. You can despatch canines by spitting fur balls at them. Not as pretty as Caesar the Cat but might appeal to Spectrum owners whose cats sit on the machine because it is the warmest place in the house.

Glass

Spectrum
Quicksilva
Shoot-'em-up
£7.99

★ ★ ★

Stunning graphics, but a prolonged opening sequence of blasting away at different aliens zooming towards you might put some people off. There are, however, three cities to attain. Also the gigantic megaships which crawl across the screen periodically become more numerous as the game progresses. Usual witty comments about what your status in the galaxy should be — like "Commodore owner".

Aabatron

BBC
Bevan Technology
Shoot-em-up
£2.50

★ ★ ★

Good, safe familiar territory here. 20 screens, lots of action, colour and noise, indiscriminate destruction, touching just about anything kills you, variable speeds from boring to suicidal. Good, clean, harmless fun. Mildly addictive and good value.

(continued from page 29)

SOFTWARE Shortlist

Highway Encounter

- *Spectrum*
- *Vortex Software*
- *3D shoot 'em-up*
- *£7.95*

★ ★ ★ ★

ZONE ZERO IS your goal. You have to take five Vortons there. And they in turn are trundling the world's most advanced weapons system, the pyramid shaped Lasertron in front of them. You have to get past marauding aliens, floating mines and abandoned oil-drums to destroy the invader stronghold.

The screen gives a Zaxxonesque three-quarter overhead view of a futuristic highway leading through the hydroponic fields, oxygen forests and fish-farms of the future. You start in zone 30 with a main Vorton and four auto-Vortons, plus of course your Lasertron. Your job is to troop along like a convoy of lorries carrying nuclear waste through the city at dead of night.

With the joystick or keyboard you control the main Vorton who is basically in the role of Sunday school teacher shepherding rather manic Dalek schoolchildren on a nature walk. They will charge along with their deadly toy until they run into something.

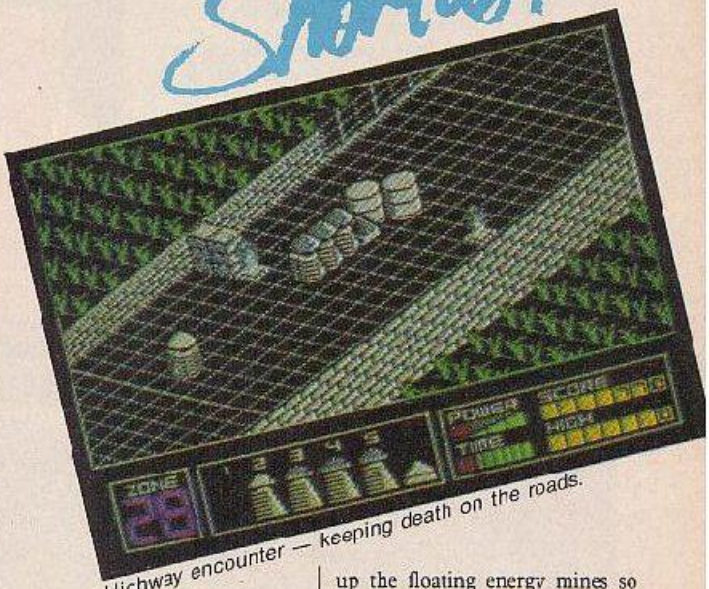
The best plan seems to be to stall the gang behind some oil drums then nip through the zones and take out the various hornswogglers, squigglies, mouffs and hostile ice-hockey pucks that assail you. Most of these creatures defy description, but are well-designed down to a gleaming reflection on the road.

There is plenty of opportunity for doing strategic things like moving oil drums around to box up the floating energy mines so that they don't hurt your crocodile of chumblies once they start charging down the highway.

At the base of the screen the display tells you which zone you are in, how many Vortons are left, and displays power, score, time left and high score.

A game for control freaks and Dalek and droid lovers everywhere.

Paul Bond



Highway encounter — keeping death on the roads.

Rupert and the Toy-maker's Party

- *CBM-64 and Spectrum*
- *Quicksilva*
- *Arcade adventure*
- *£7.99*

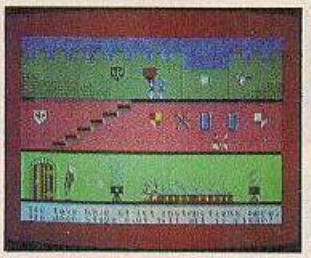
★ ★ ★

RUPERT'S CHUMS are holding a wild party — oodles of currant buns and lashings of pop. But getting the ancient teddy bear there on time is going to be no picnic.

You have to manoeuvre the geriatric Rupert through seven screens of great graphics to what are presumably his sixty-fifth birthday celebrations. Rupert's first computer escapade is played out in and around the toymaker's castle.

The toymaker himself never puts in an appearance but there are plenty of his products about — most of the toys are out of control and aiming to make a nasty mess of the cuddly bear. But animal lovers shouldn't worry; no nasty incidents of mammal mangled in clockwork. The worst that happens is that Rupert takes a tumble and after six of those the game ends.

Toymaker's Party is a platform game with the action viewed from the side. You have to get Rupert to collect the party invitations pinned to the walls to progress to the booze and buns.


Rupert gate-crashes a wild party.

He hops and jumps energetically over an assortment of runaway jack-in-the-boxes, toy soldiers and trains, and can hitch a lift to safety on the back of magpies and toy aeroplanes. Be careful in the later stages — toys that were benign become killers and what were dangerous gadgets suddenly become Rupert's allies.

The setting for this game may be out of the nursery, but it's good clean fun to play and the graphics and music are as good as any you'll find in a CBM-64 platform adventure.

Toby Wolpe

The Scout Steps Out

- *Amstrad*
- *Amsoft*
- *Platform*
- *£8.95*

★ ★ ★

TO CALL THE Scout Steps Out a platform game may be a trifle unfair. Only a few of the game's 13 screens contain platforms and there is not a conveyor belt or crumbling ledge in sight. Instead you may have to swim underwater, pick your way through a forest in search of mushrooms, or dodge the keepers in a park. Other exotic locations include an animated circuit diagram and a rain-swept block of flats.

You start off at base camp where

Be prepared — Scout Steps Out.

(continued on page 34)

'Three of a kind, O.

My really brill two:

1. Summer Games II *from US Gold. I'm a value freak and a closet athlete and now I can play in my silver lurex tracksuit!*

2. Sparklers Special *from Sparklers – 'cause this way I get four absolutely triff games for the price of one!*

3. Just Mystery Me!

My pick of Arcade and Adventure

GLADIATOR

by Microgen

This is Roman arena 'Hail Caesar stuff'. Slay or be slain in 15 very gory contests. Plus gambling for your life. Even worse than a series with Lenny Henry. Well, almost.

Spectrum 48K £7.95

DYNAMITE DAN

by Mirrorsoft

I warn you – your mind and everything else – is going to be *blown!* I mean boom, boom. Believe me, these are horribly impossible puzzles, only *so* good. And really special graphics that keep you jumping all the way through.

Spectrum 48K £6.95
Amstrad £7.95

Quake MINUS 1

by Monolith

You look like a recruit for the Robot Liberation Front – they only take weirdos like us! All we have to do is demolish the undersea Titan power plant and sort of bust up the world with quakes and tidal waves, OK ya?

Commodore 64 £9.95

TERRORMOLINOS

by Melbourne House

This is the Costa Blanca gone stark staring bonkers. To survive the disasters of this utterly ugh family holiday you have to enter a saucy postcard world. To escape, you have to look snappy – literally – by bringing back 10 photos that prove you were there!

Versions for most machines £7.95

THORN EMI Computer Software

International Micro Software Division

K ya?'

JUGGERNAUT by CRL

From the micro-makers of the Rocky Horror Show comes this 'rocky road show'. You drive a giant articulated lorry through roads and blockages you won't believe.

Spectrum 48K **£7.95**

SPARKLERS SPECIAL

by Sparklers

How did they cram so much in? Like *Slurpy* the greedy-guts who guzzles Glowbugs and other similar yuk. Like *Orc Attack* with you defending your castle against plebs. Like *Black Hawk* the ultimate combat plane with 30 levels of play. And like *River Rescue* with you in the speedboat trying to save scientists, as if you'd bother!

Commodore 64 — 4 games **£7.50**
Spectrum 48K

Something for you armchair athletes

TOUR DE FRANCE

by Activision

After 16 gruelling Stages round scenic France, you may never face a saddle or a yellow jersey again. If you're certain your joystick skills are 'formidable' – get pedaling!

Commodore 64 **£9.99**

INTERNATIONAL BASKETBALL

by Elite

Are you ready to jump, block and steal? Twist in mid-air? Go for basket after basket against 3 opponents through 9 skill levels from the utterly pathetic to Harlem Globetrotter? You *are?*

Spectrum and Amstrad **£5.99**

SPOT THE BALL

by Creative Sparks

Two sports classics in one pack, but you only play one at a time, right? There's soccer and snooker, there's shooting and potting. Both need skill and timing plus a joystick plus 32K ram. Now go spot the ball!

Atari 32K **£8.95**

SUMMER GAMES II

by US Gold

Stage your own Olympics! With 1-8 players and eight events, practice sessions *before* the real thing, then Ceremonies, National Anthems – the lot! You'll be as flakers as me after cycling, fencing, kyaking, high and triple-jumping, rowing, javelin and riding. Really, really good.

Commodore 64 **£9.95**

It's 'bats-out-of-hell' time!

RED ARROWS

by Database

They call this flight simulation – *stimulation* more like! You get 3D on the graphics and 6G on the aerobatics. RAF pilots helped write this program. For most micros.

Cassette **£8.95**
Disk versions **£11.95 and £12.95**

ARNHEM

by CCS

This is actually more risky than a Harrods Sale – really. Just like 1944 in the second world war, you're in a tactical wargame, parachuting behind enemy lines to snaffle vital bridges and let the Allied Forces through. 1 or 2 can play.

Spectrum 48K + **£8.95**
Amstrad version **£9.95**

Super plays for rainy days!

SOUTHERN BELLE

by Hewson Consultants

Bet you can't get your steam train through 24 stations with enough water and coal left to get you to Brighton on time. What with signals, tunnels and other snags, by the time you arrive you'll be steaming!

Spectrum ZX 48K **£7.95**

Trivia by Anirog

This is a quiz! The computer rolls the dice and asks the questions in 6 categories – one or two of which even bone-heads can answer. Nearly 2000 questions and most of them really silly.

Versions for most machines **£9.95**

Win

IDENTIFY THIS MONTH'S MYSTERY MICRO-GAMER AND WIN A 2-PACK PROGRAM PRIZE – TEN MUST BE WON!

If you know her name, send this coupon back to us, not later than 7th September 1985. The first ten correct entries drawn will each receive *Summer Games II* and *Sparkers Special*.

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Machine _____

Address _____

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Stephen Martin, London
Ian Williams, Caernarfon
J R Barnsley, Stafford
Nick Withey, Swindon
Jonathan Maycock, Newcastle upon Tyne
D Kirby, Greenford
Geoff Bedford, Mellor
Christian Mead, High Wycombe
Lee J Gomm, Berkhamstead
Patrick Oliver, Birmingham

Last month's Mystery Microgamer was Kenny Everett

10 prizes are on the way

All games featured above are available from Laskys, WH Smith and other good software stores

Star chart

Desert Burner

Spectrum
Creative Sparks
Shoot-em-up
£2.50

★ ★ ★

Another implementation of the ever-popular moon-buggy genre. You have to leap over various obstacles whilst keeping an eye on the various things flying around chucking things at you. However, this version combines this with speed control which varies the length of the jump. This makes the process of jumping over things a great deal more fraught. Too fast and you won't come down in time for the next jump, too slow and you won't get over. All in all a good little pot-boiler.

Metabolis

Spectrum
Gremlin Graphics
Arcade adventure
£6.95

★ ★ ★

You are a bird. The Kremins metamorphosed you, so you have to find the serum room to get back to human form. There is a wizard who cures you of all ills. You need a licence to kill as well. Interesting and quite humorous graphics.

Nick Faldo Plays The Open

Spectrum
Argus
£9.99

★ ★ ★

Icons are all the rage these days and are well to the fore in what is probably one of the best golf simulations around.

The icons at the base of the screen allow you to choose clubs and control, force and direction of shot. You have a caddy who doesnt tell you what to do, but says things like "OK" in a little speech bubble if you're making sensible decisions. Not a golfer myself, but the accompanying booklet is informative and should appeal to learners of the ancient game.

(continued from page 31)

your troop of scouts is bivouacked. The game tells you that your mission is to be a good moral example to your troup. Translated into playing action this means finding the route that will take you to the next screen and picking up objects along the way. As each screen is crowded with a different set of life-forms, all of them hostile, this is no easy task. But if you can get back to screen one there is a large bowl of cornflakes which will restore any lives lost.

The authors, Dave Rogers and Colin Hogg, are regular *Your Computer* contributors; and if you have ever keyed in one of their programs, you will know that their games have a highly original flavour. What makes this one special is its graphics. Almost every screen has some pleasingly inventive touches, while the wet scenes in particular are a maritime marvel: rolling waves, rotting octopuses, and some superbly convincing sound effects.

Simon Beesley

Dynamite Dan

- *Spectrum*
- *Mirrorsoft*
- *Platform game*
- *£6.95*

★ ★ ★

THERE IS certainly plenty here on the menu: eggs, cocktails, fruit, cheese, cake, ice cream, tea, soup — certainly the greatest variety of cuisine ever encountered by anyone trying to stay alive in an arcade adventure game.

Plenty of interesting things to pick up as well — credit card, deodorant, test tube, oxygen, dynamite — of course — and the top secret plans.

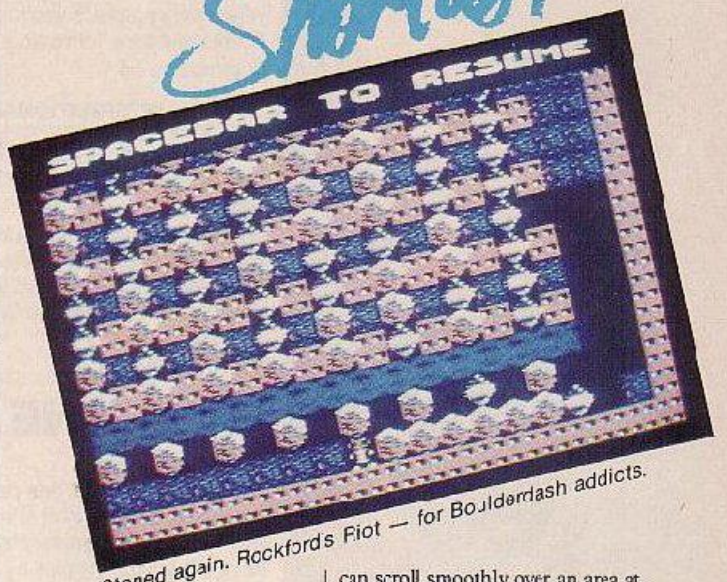
As Dynamite Dan you must thwart the plans of Donna and Blitzen (geddit?) as they try to take over the world. The top secret plans are for a super psychon mega-ray; Dynamite Dan must garner eight sticks of dynamite so he can bust into the safe where the plans are kept. As you guide the prospective peterman in his odyssey, plenty of ugly insects, acrobatic hydrae and other nasties assail him.

You should also beware of attacks of negative buoyancy — Dan can't swim — warning beeps indicate imminent starvation.

An interesting permutation on the theme is the use of trampolines at strategic points in the game — you can bounce around to your heart's content.

Paul Bond

SOFTWARE Shortlist



Stoned again. Rockford's Riot — for Boulderdash addicts.

Rockford's Riot

- *CBM 64/Spectrum*
- *Monolith*
- *Excavation game*
- *£9.95*

★ ★ ★ ★ ★

INSTANT RELAPSE. Just when you thought you had licked your addiction to Boulderdash — easily the most potent game of 1984 — someone offers you a go at its sequel, Rockford's Riot. Pretty soon you dislodge a boulder, triggering off an avalanche. It gives you your first rush and the craving for more returns. To make matters worse, Monolith has included a copy of Boulderdash on the other side of the tape.

Rockford's Riot uses the same ingredients — boulders, jewels, amoebas, butterflies, fireflies, enchanted walls — but presents a brand new set of problems. There are 16 levels or caves as the cassette inlay calls them. In each cave you can scroll smoothly over an area at least six times the screen size. And in each you have to collect a given number of jewels within a time limit. But beyond this common factor there is enormous variety so that each level could almost be described as a separate game.

Take cave B for example. Amoebas are oozing out from the tops of three large vats. So you must first shift boulders to seal them in. If you succeed the amoebas turn into jewels. Then you have to dash down to the bottom of the vats, unplug them, and when the avalanche of boulders has settled, collect 75 jewels before time runs out.

Collecting jewels is a problem in itself. They are invariably embedded in a pile of boulders. As the game simulates perfectly the physics of rock falls, you only have to extract one for the whole lot to come tumbling down. When it is accompanied — as it is on the CBM-64 — by a distant booming this provides one of the most satisfying experiences in computer gaming.

Simon Beesley ■

Save the world with Dynamite Dan: Mirrorsoft's explosive action.

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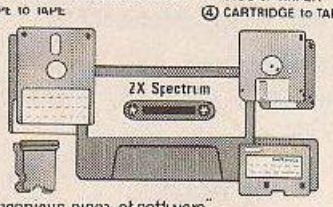

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Amstrad SSA-1

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Amstrad
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Hot on the heels of the DK Tronics unit reviewed in June, this is the "official" version. As it uses the same chip, and most of the commands do similar things, there isn't a great deal to choose between the two.

However, this version makes "legal" calls and so is compatible with all past and any future add-ons.

Hyper Shot

Game Controller
Various
£9.95

Joystick just so much twisted plastic? Still after that elusive four-minute mile? Well, for sports enthusiasts everywhere, Konami has brought out a box with three hopefully very robust buttons which simulate left, right and fire joystick movements. Plugs into any Atari-style joystick port. Available direct from Konami on 01-429 2446.

Discovery 1

Disc System
Spectrum
£199.95

Granted the Spectrum owner's reluctance to buy a peripheral that costs more than the original system, does the Discovery add up? For your money you get a disc drive, a printer port, a joystick port, a built-in power supply and a monitor output.

The disc system is excellent. The single-sided drive gives you 80K formatted capacity. It is compatible with all Microdrive commands, but also has a full complement of "proper" disc commands. These include random access files as well as a Ram disc system where an area of memory is set aside and acts like a fast disc.

Blank 3½in. discs are widely available, and are rugged and reliable. A fast disc drive with a powerful operating system. But will it tempt the budget-minded Spectrum owners? Available from Boots.

HARDWARE hot list

Databeeb

- *BBC*
- *Miracle Technology*
- *£25*

IF YOU FANCY breaking into the world of micro communications, you'll need three things: a computer, a modem, and, perhaps most importantly, the software. Along with the usual Prestel and Bulletin Board software, Databeeb has facilities for controlling the company's Minor Miracles modem, in much the same way as the ZROM works for the Demon.

However, there are major differences. Databeeb uses the User port to control the modem, leaving the RS-423 port free for data handling. It also has BABT approval! The modem can be upgraded to get the most out of the new Rom. Auto answer, auto dial and mode selection upgrades are available. The whole lot, modem with all the extras and Databeeb, comes to around £200. But this is a piece of kit designed up to specificatioin rather than down to cost.

If you are looking at Databeeb as a Comms Rom for any modem, it compares well with Pace's Commstar, its main rival. In Prestel mode, the last 16 pages are stored in Ram and the user can select eight others. These can be redisplayed and then treated as though they were the current frame for routeing purposes.

The Databeeb — software on a Comms Rom for any modem.

Unfortunately, no off-line message editor is provided, and a printer dump is available for text only. The operating system can be accessed at any time by pressing the copy key. The bulletin board type software has the usual facilities to direct output to printer and/or disc.

40 and 80 column modes are available, and the various commands are displayed optionally at the bottom of the screen. File transfer uses the X-modem format of Commstar. The software supports X-on X-off protocols, local echo, line feeds and a variety of data formats are provided.

All the modem's functions are available through "star" commands, which means writing simple bulletin boards, doing unattended downloading, or even a little hacking should not tax anyone's basic programming skills.

If you've got a Miracle modem, and are thinking about upgrades then this is a good starting point. For anyone else, there is little to chose between this and Commstar. It's really a matter of personal taste.

Lee Paddon

Logotron Sprite Board

- *BBC Micro*
- *Logotron Sprite Board*
- *£179.95 — or £239.95 bundled with Logotron Logo. There is a discount for schools*

THERE'S MORE to Logo, say Logo enthusiasts, than turtles. And indeed there's more to turtles than plotting those familiar geometrical patterns. With Logotron's sprite board, you can even write a game.

The board comes in a small metal box which links via a ribbon to the BBC's 1MHz bus and by a second cable to the power connector.

You activate it by selecting Logo and loading a long — &4300 bytes — file, whereupon you're prompted to switch to the sprite screen. This you do by plugging your monitor into the sprite board, which now directly provides the video for your screen — there's a choice, RGB, composite PAL or plain ordinary uhf TV signal.

Logotron Sprite Board — write games without learning code.

The result of this is a sort of super-Mode 2 screen with 16 colours, including dark and light shades. At your disposal now are 32 sprites masquerading as turtles, each of them capable of assuming any of 64 shapes. There's a selection ready-made: a lorry, a tulip, a dog, a cross and so on; and of course a profusion of turtles, both realistic and symbolic. To define your own shapes, you can call up an excellent built-in editor.

And to animate them you can draw on nearly 50 new Logo commands. You can whizz turtles around the screen, manipulate them independently or together, detect collisions and fill this or that with colour. So in theory you could write your own Frak! without having to learn machine code.

All great fun, and educationally very sound if rather expensive. But the software wouldn't run with my non-Acorn disc interface. And the computers I tried wouldn't always power-up correctly with the board connected. Check before you buy.

Richard Lambley ■

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ULTRAKIT is the most powerful interactive toolkit yet for ZX BASIC. All the features you will ever need:

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C combines high-level structuring with direct control over the machine, all at compiled speed. Our compiler is now available from good retailers, and has proved extremely popular. It supports all statement types (plus inline code) and over 40 operators; whilst char, int, unsigned and combinations using pointers, arrays, structures, unions, functions, and typedef are all allowed data types. External and static variables can have initializers, whilst auto variables support recursion. There are six preprocessor directives and over 60 library functions with a selective inclusion scheme.

FONT 464 is an easy-to-use program enabling you to design, edit, and save your own characters and graphics for simple use in BASIC programs. There are 6 pre-designed fonts and sophisticated printer-driving software which allows high-resolution screen dumps and letter writing on Epson compatibles or the DMP1.

DEVPAC is a complete machine code development package. It is the second one that many people buy, because after the first one they know what to look for! The 'front panel' debugger is the only way to really see programs in action, and assembly from multiple source files is fast enough to satisfy its most demanding users – ourselves.

Pascal is a valuable educational and development tool as well as running typically 40 times faster than a BASIC equivalent. Our compiler is an almost full implementation which compiles direct to machine code (no slow P-codes). Multiple file inclusion allows very large programs to be compiled.

MON QL is our latest product and our first on the QL; it was written by Andy Pennell, who has a great deal of experience on the QL. It is similar in style to the well-known MON 'front panel' in DEVPAC and includes additions like job control and multi-tasking support. It also catches system exceptions and includes fixes for QDOS.

Product Price Table

	Pascal £	DEVPAC £	C £	ULTRAKIT £	FONT 464 £
ZX Spectrum	25-00	14-00	25-00	9-45	
Amstrad CPC464	29-95	21-95			7-95
MSX	29-95	19-95			
CP/M-80	39-95	39-95			
Sharp	39-95	25-00			
Sinclair QL		19-95 (MON QL)			

All prices are for cassette versions (except CP/M and QL) and include VAT and p&p in the UK. Please contact us for export orders, disc formats or detailed technical information packs. All products are available by mail order: please send a cheque or Postal Order. Sorry, we do not accept credit cards.

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ADVANCED Z80 MACHINE CODE

A new authoritative guide, for those who want to improve their Z80 machine code programming skills to a genuinely professional level, has just been published by Interface at £12.95.

If you already know the fundamentals of programming in Z80 machine code, and now want to expand your skills, to tackle advanced, serious and practical program development, then this is the book for you.

Advanced Z80 Machine Code Programming, by William Nitschke, fills a serious gap in the literature on programming the Z80. Rather than dealing with the elementary concepts of Z80 architecture, this new book discusses the material you now need to know to advance your skills. The core of the book looks at popular programming applications. Starting with the basics of organising information, generating arrays and tables, block moving, shifting and erasing, string manipulation, data compression and command tables, it moves on to advanced applications like word and sentence decoding. Games programming is then examined in detail, including three-dimensional maze generation, animated graphics and the development and coding of arcade games, and the synthesis of speech and sound effects. There is also a complete set of 'undocumented' Z80 instructions.

You can buy *Advanced Z80 Machine Code Programming* by William Nitschke (ISBN 0 907563 90 2) at £12.95 from most book and computer stores, or direct from the publisher, post free, at:

Interface Publications Ltd., Dept YC,
9-11 Kensington High Street,
London W8 5NP
(Trade only: WHSD Leicester)

Interface

NEWS

The crystal ball

Melbourne House has now brought out a new and vastly improved version of The Hobbit on disc for BBC B owners. As well has having an increased number of locations, the game features graphics for the first time for Beeb owners — over 50 different screens of them.

The BBC B disc version costs £17.95. A superb disc version is already available at the same price for the CBM 64. Tape versions cost £14.95 and include BBC B, Commodore 64, Spectrum, Oric/Atmos, MSX and Amstrad micros. Only one thing to say — when can we expect an Atari version?

Great news for Infocom addicts — a new adventure called Wishbringer has just been released.

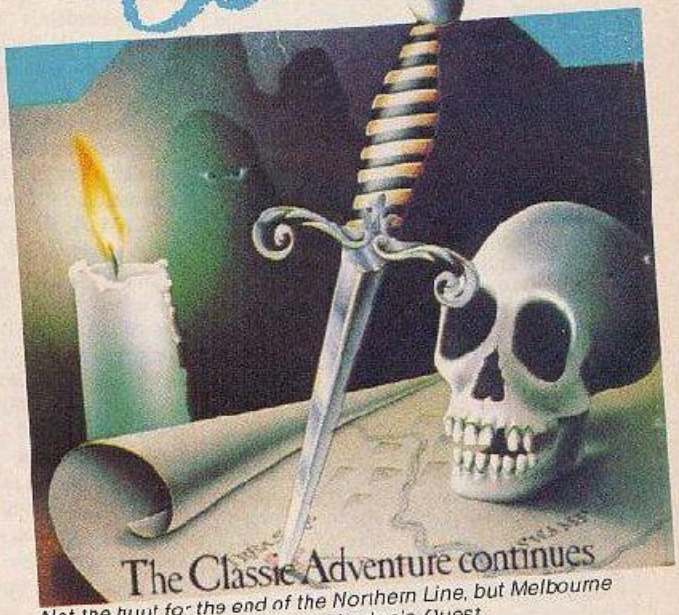
A helping hand

Fulvao Cerlesa, an Italian devotee of English adventures, has called again, this time to request help with Adventure International's Gremlins (his phone bill must be colossal!):

Cannot kill all the gremlins?
METS YSTN EVEH TNIM EHTP ART
Want some more assistance?
SNIL MERG PUWO LBNE HTST NEVR EVOS ETAL FLAT EMDL EW
Don't know the essential kit?
EPIP SAGD NA(P UTUC) XOB LIAM
Some players are puzzled in Acornsoft's Philosopher's Quest:
Portcullis won't open?
TELU MAYB UREH TBUR
Can't get out of the whale?
HTOO TEHT GNIT TEGE FOFE BDOO WTFI RDTH GIL
Yours against ghosts and gremlins,
Hugo North.

QUEST Carnet

Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.



Not the hunt for the end of the Northern Line, but Melbourne House's latest adventure — Mordon's Quest.

Mordon's Quest

- *Spectrum/CBM-64/Amstrad*
- *Melbourne House*
- *£6.95*

FROM JOHN JONES-STEELE, the author of Melbourne House's popular Classic Adventure, comes this superb new text adventure. It has over 150 locations, a vocabulary of more than 400 words and uses clever text-compression techniques.

You begin in the master bedroom of a house, having just fallen out of a four-poster bed. Mordon, one of the seven Lords of Realities, soon appears to tell you that a power-crazed Lord has broken up a life-controlling machine and dispersed its seven component parts through time and space. Your task is to seek out the pieces and return them to the house.

Armed with a blanket, torch and transporter unit, you're soon in a jungle where the quest begins in earnest. Quicksand, a carnivorous plant which can't be killed — it's a protected species! — and a pygmy's hut — complete with AA, plate and knife symbols — are the first of many challenging problems.

With its detailed atmospheric text and touches of humour, Mordon's Quest guarantees many hours of stimulating pleasure.

Beatle Quest

- *CBM-64*
- *Number 9 Software*
- *£9.95*

PREPARE YOURSELF for a trip back to the Swinging Sixties — the Fab Four have just made their first-ever authorised appearance in an adventure.

Beatle Quest is a Quilled text adventure which revolves around a wide selection of lyrics from the Beatles' songs. Much of the fun comes from spotting them. The game contains over 150 locations, 60 objects and 200 messages. You must amass 1,000 points by solving puzzles, collecting items and completing certain actions.

The quest begins in a bedsitter where a strange but beautiful girl is asleep on the divan bed. Tempting as it might be, trying to awake her with a kiss results in a deadly embrace and it's goodbye, goodbye, goodbye.

Out in the street, those shops that are not closed for the half-day merit further exploration. You'll need to find a certain object fairly quickly because your body soon starts to tremble and vibrate. Unless you obtain this vital nutrient, you'll end up as dead as surely as if you had been walloped with Maxwell's silver hammer.

Magical mystery tour — Number 9's Beatle Quest.

The text abounds with reference to the songs. For example, in a lonely side street you can't help wondering where all the lonely people come from, where do they all belong. A dental surgery is owned by a Dr Robert. Down at the railway station, a sign informs you that the "one after 909 has been cancelled".

Asking for help is answered with "you'll get by with a little help from your friends" while attempting to do something impossible is met by "Oh . . . you can't do that".

If most or all of these allusions mean nothing to you, then you won't get much out of the game unless you brush up on the Beatles' songs first. For those still steeped in Beatlemania, the quest offers a tough but nostalgically enjoyable experience. ■

CP/M — PLUS OR MINUS?

One of the earliest microcomputer disc operating systems, CP/M runs on hundreds of different makes of computer. Z-80 versions are known as CP/M-80, in contrast to CP/M-86 or CP/M-68 which run on 16-bit processors.

Originally written — by Digital Research's Gary Kildall — to fit on micros with only a limited amount of Ram, it has remained a relatively unfriendly system to work with. Some CP/M commands are cumbersome to use; while, far from being friendly, its error messages are often downright hostile.

But the crucial point about CP/M is that it can be implemented on almost any Z-80 micro and its software is portable. Programs written for one CP/M machine will run on any CP/M machine.

There is a vast range of application software running under CP/M. Because the system has been around for so long and on so many machines there are literally thousands of programs available to the CP/M user.

Two qualifications need to be added here. First business software is not cheap. Home computer owners who are used to paying, at the most, £50 for a word processor on Rom will be staggered to find that some of the best-selling CP/M programs can cost several hundred pounds. Second, buying a CP/M program involves more than just choosing the right package. You need to find a distributor who can supply software on 3in. discs and in the Amstrad's disc format. You will also have to customise CP/M software to work with the 6128's screen and keyboard configuration.

However, as it turns out, neither of these problems looms large. Anyone seriously committed to using a micro to help run a small business should be prepared to spend as much on software as the hardware itself. And apart from CP/M classics like Wordstar, dBase II, and Supercalc, there is a considerable amount of software that comes a lot cheaper.

Customising a program to work with a particular computer is mainly a matter of telling it what the machine's screen parameters and control codes are. Amstrad has made the task easy by setting the 6128 up to emulate a VT-52 terminal. Most CP/M software comes with an installation program which includes an option for this widely-used type of terminal. On top of this there is already a number of distributors — Timatic Systems and Honeysoft in particular — who supply CP/M programs tailored for the Amstrad on 3in. discs.

Business applications apart, one of CP/M's other attractions is that it supports compilers for almost every known computer language. You can even run the Z-80 version of BBC Basic on it. Quite a few languages are also in the CP/M User Group's large Software Library. Its contents include assemblers, word processors, text adventures, communications software, music files, and hundreds of miscellaneous disc utilities. Most importantly, it is in the public domain. In other words, except for a small copying charge, it is all free.

AMS

THE AMSTRAD 464 was launched in June last year at about the same time as the bug-freer QLs began to hit the streets. 15 months later only 50,000 QLs have been sold while the Amstrad has established itself as one of the three best-selling home computers in Britain. How is it that in a year when almost every other micro manufacturer folded or floundered, Amstrad has flourished?

Undoubtedly one reason is that the 464 comes with a monitor and built-in cassette recorder at an unprecedently low price. But equally important is the fact that, although its design is not especially advanced, it scores highly in almost every department — graphics, sound, Basic, construction, and I/O connections.

This computer is largely free of the quirks and omissions that flaw most other micros: a tacky keyboard on the Spectrum, antiquated Basic on the CBM-64, bugs on the QL and Oric, the memory-starved BBC, and so on.

Amstrad followed the 464 with the 664, which has a built-in 3in. disc drive in place of the cassette recorder. It has a few extra Basic commands such as the graphics command Fill, and sacrifices 1,280 bytes Ram to the disc operating system. But its major difference is the ability to run CP/M 2.2, which is supplied partly on disc and partly on Rom. The idea behind providing CP/M is to widen the machine's scope for attracting business users.

Just a few months after the launch of the 664, the company has now produced another computer with a built-in disc drive, the 6128. This comes with a total 128K Ram and runs an enhanced version of CP/M 2.2, CP/M Plus. It is still software compatible with the earlier models.

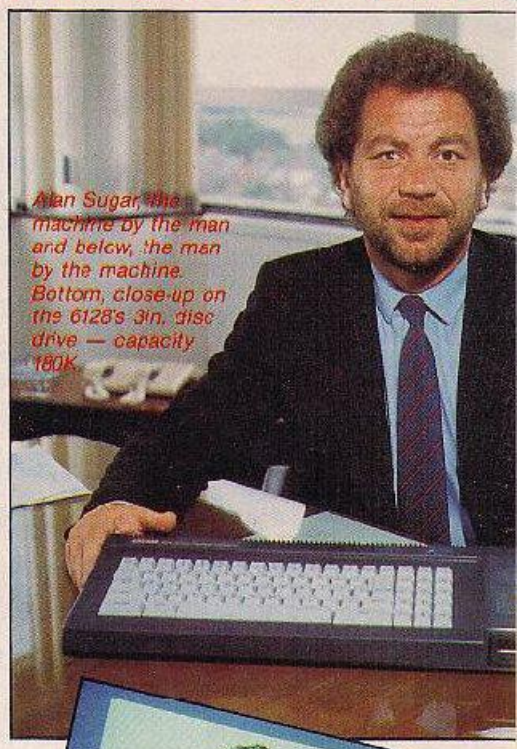
Although the 6128 offers more than the 664 — which will be quietly dropped from production — it costs less: £299 with a monochrome monitor, £399 with a colour monitor. If you are not fussy about picture quality you can buy a £30 modulator and use the monochrome unit with a colour TV.

Originally Amstrad announced that the 6128 was solely for the American market. It is not hard to guess why the company has delayed the announcement of the machine's U.K. launch until the last minute. But it is tough if you have just spent £449 on a 664.

In appearance the 6128 is more or less the same as the 664. Amstrad has sensibly repositioned the cursor keys at the front of the keyboard and the overall height has been reduced. At the back there is the same array of ports as on the earlier model — a Centronics-style printer interface, an expansion port, and a socket for a second disc drive. Also unchanged at the side are the cassette and joystick ports together with a stereo jack for sound output.

Apart from the addition of CP/M Plus and another 64K Ram the machine's specification is the same as the 664's. Based around a Z-80A processor running at 4MHz, it carries 128K Ram and 48K Rom. The Basic interpreter and the operating system are held in 32K of the Rom, while the remaining 16K contains Amsdos and a small part of CP/M. Amsdos is Amstrad's own disc operating system which serves as an alternative to CP/M.

The two systems coexist peacefully, reflecting the 6128's dual nature both as a small business machine and a home computer. Basic is switched out when CP/M is running so you cannot then



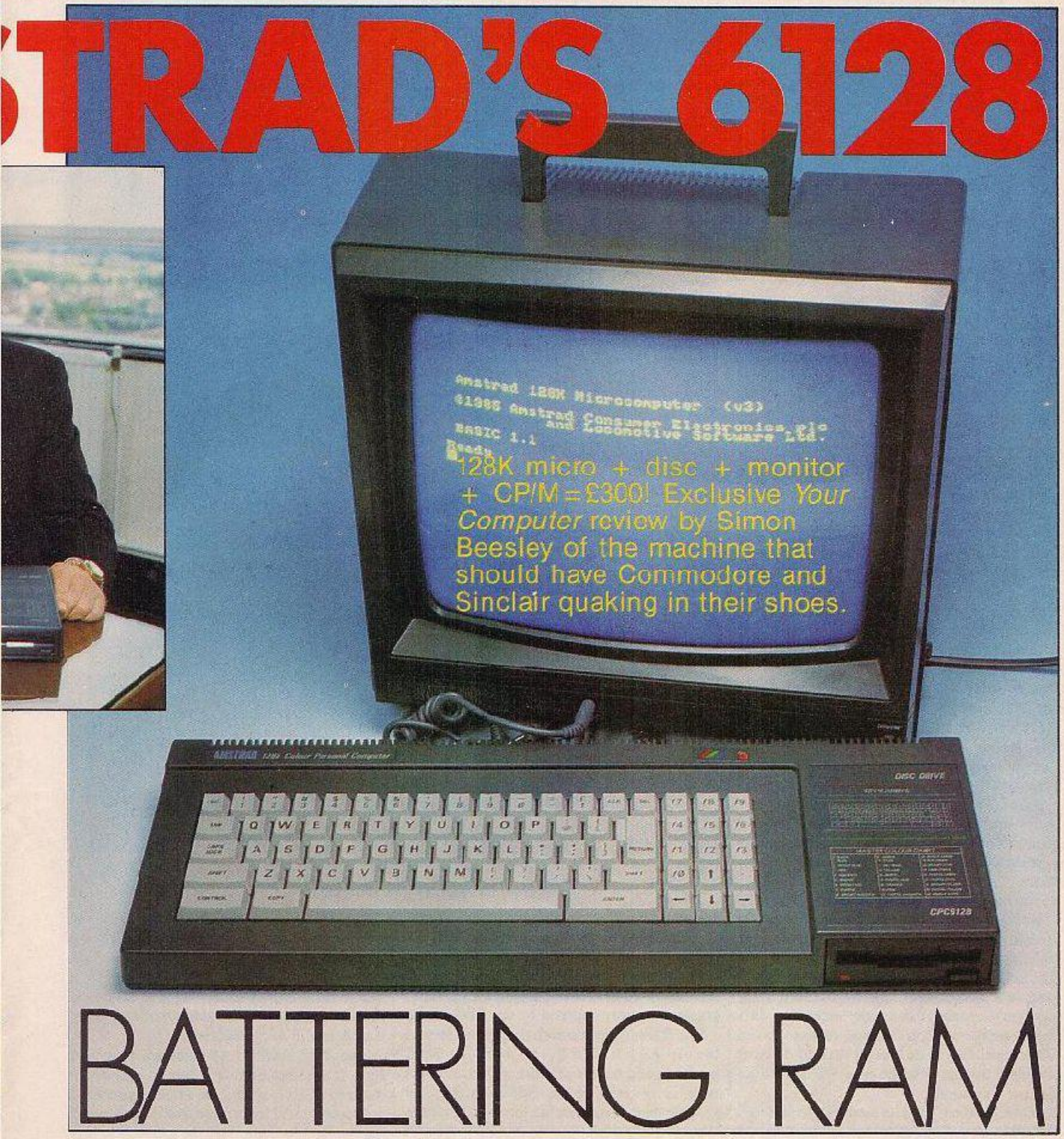
Alan Sugar, the machine by the man and below, the man by the machine. Bottom, close-up on the 6128's 3in. disc drive — capacity 180K.

load or save Basic programs. If you are using Amsdos you need to run CP/M to format discs, back up and copy files; otherwise you can ignore it.

When Amsdos was first introduced Amstrad described it as a fast cassette system. You might expect a disc operating system to be rather more than this. And, indeed, as disc operating systems go Amsdos is fairly rudimentary. There is no facility for creating random-access files and only a limited spread of disc commands. Still, what it does offer is probably quite adequate for the average user's purposes.

Some people have berated Amstrad for choosing 3in. disc drives rather than the more common 3.5in. drives. But the 3in. discs have

STRAD'S 6128



BATTERING RAM

a respectable capacity of 180K on each side, and you can always add a 3.5in. or 5.25in. as a second drive.

Two discs are supplied with the machine. Along with CP/M Plus and its accompanying disc utilities, they hold a useful collection of programming utilities, a full 48K version of DR Logo, and GSX, a Graphics System Extension designed to let CP/M programs handle graphics. For good measure Amstrad has also thrown in the software that went with the 664 — CP/M 2.2 and a stripped-down version of DR Logo.

GSX is the 8-bit forerunner of Digital Research's GEM. Introduced a bit late in the day, so far it has had little success. With the notable exceptions of DR Graph and DR Draw not much software has been written for it. If someone were to add the 8-bit equivalent of GEM Desktop, GSX could give the Amstrad icons and windows in CP/M. But the result would probably be rather slow.

Another of the disc programs, Bank Manager, demonstrates some extra Basic commands which make use of the spare 64K Ram. As an 8-bit microprocessor the Z-80A can only address 64K of memory. So the 128K Ram is not organised as one block of contiguous memory, but as two banks of 64K, only one of which can be accessed at a time. You could not, for example, run a Basic program larger than 64K.

Two of the commands supplied by Bank Manager allow Basic programmers to store and display up to five screen images. The others use the second memory bank as a filing system. What these commands do not provide is a facility for storing programs, or variables as on the Commodore 128. No doubt machine-code programmers will find all sorts of interesting applications for the extra Ram; and, possibly, commercial games writers will be able to exploit it. But by and large it is not of much benefit if you are working in Basic.

In fact the main reason for giving the 6128 128K is to allow it to run CP/M Plus, which is designed to take advantage of bank-switched memory. One of the problems with running CP/M 2.2 on the 464 and 664 is that it leaves

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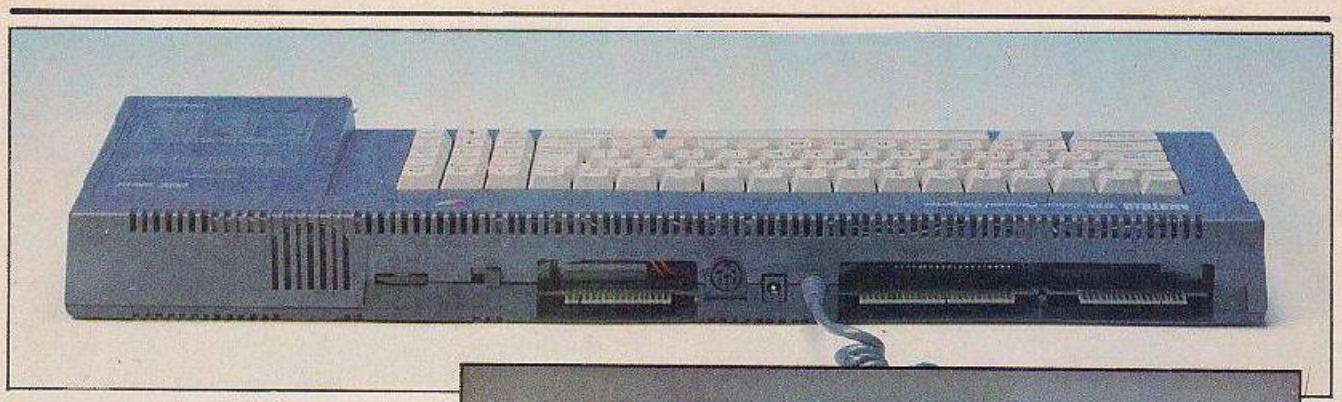


(continued from previous page)

only 39K Ram for programs — not enough for most heavyweight CP/M packages like Wordstar.

By contrast CP/M Plus sits in one of the two banks of 64K Ram and loads programs into the other. In this way it makes 61K Ram available for programs, which is more than enough for any 8-bit CP/M program.

CP/M Plus takes up around 21K and represents a substantial improvement on the earlier 8K version. Not only is it faster in loading and saving to disc, but it is also easier to work with. Thus you can give it multiple commands on a line, recall previous commands, and edit lines. Along with a number of other enhanced features there is also a provision for switching to different national character sets — German or American, for example.

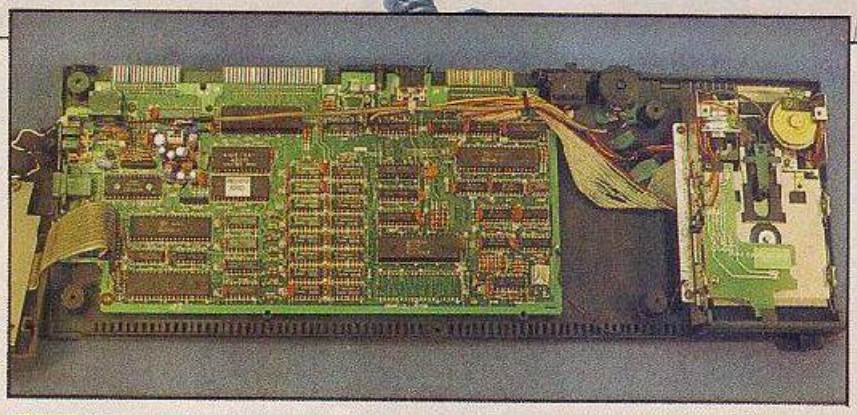
None of these features will interest people who use the 6128 as a home computer pure and simple — the sort of owner, say, who has moved up from a Spectrum. CP/M programs cannot, of course, take advantage of the Amstrad's graphics or sound. With the exception of text adventures, most CP/M games are of the sort that date back to the dawn of microcomputing — Tic-Tac-Toe, Ping Pong and the like.

So, leaving CP/M and the extra 64K aside, it is worth considering how the 6128 matches up against the opposition on the home computer front.

Amstrad Basic is almost as extensive as BBC Basic, and only a fraction slower. Among its special features are commands to harness interrupts from Basic — Every and After — and the facility for defining up to eight text windows, and one for graphics. As on the BBC, the operating system is unusually accessible via a large number of jump blocks — or vectors — in Ram. Extending Basic is easily done by defining Resident System Extensions — RSXs — to act as new commands.

There are three graphics modes which are well supported by Basic graphics commands. At the lowest resolution, 160 by 200 in Mode 2, you have a choice of 16 colours from a pallette of 27. The highest resolution is 640 by 200 or 80 columns by 40 rows of text. Again, the machine's graphics are only equalled by the BBC Micro.

Sound is supplied through the internal speaker by the AY-3-8192 chip, as found in MSX machines and dozens of other micros. It is not quite as powerful as the CBM-64's chip but still gives three voices with full envelope definition.



World processing — top, how the 6128 interfaces with the outer world. The bare bones — middle, what the 6128 is like inside, and bottom, the fully-cloihed machine.

Another plus is the facility for switching out the Basic Rom and adding alternative 16K Roms which plug into an external sideways Rom card. Once again this is also available on the BBC. Where the Amstrad scores over the BBC is in providing over twice the amount of user Ram. And it is also a lot cheaper.

Instead of sharing 64K between Rom and Ram, it switches Rom and Ram in and out of the same memory space. The screen memory and operating system work space take 21K of one of the two Ram banks, leaving the user 43K to play with.

The only serious rival to the 6128 at this price level is the new Commodore 128. Like the Amstrad the CBM-128 offers CP/M Plus and 128K Ram. It can also run CBM-64 software. Although there is already a large amount of games software for the Amstrad it does not begin to compare with the range of CBM-64 software.

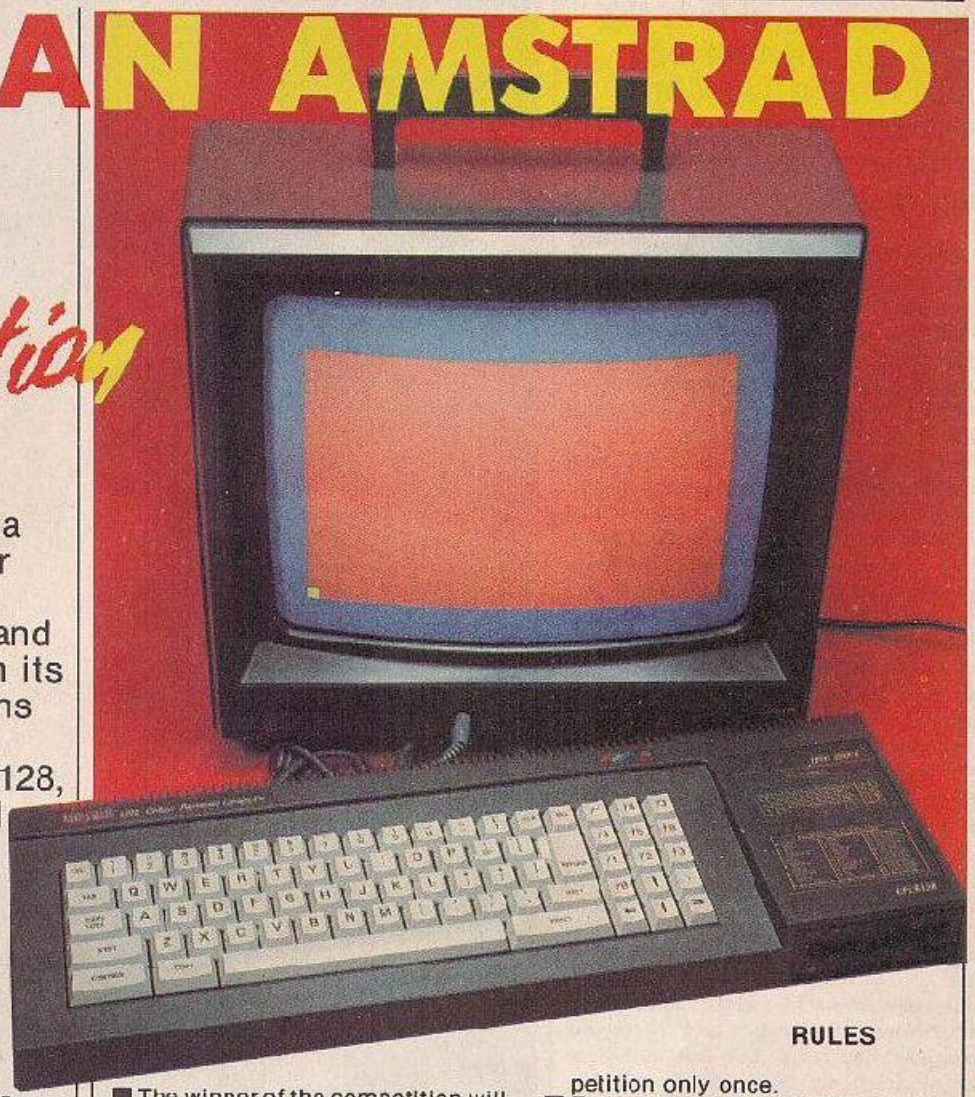
Set against this factor is the Amstrad's price advantage. The stock CBM-128 is expected to cost around £270. To kit it out with a monitor and disc drive will cost you twice as much. Both machines probably represent the final flowering of 8-bit micros, a species now reaching the end of its term. But in terms of value for money the 6128 is the best buy on the market. ■

CONCLUSIONS

- The Amstrad 6128 is exceptionally good value. Add the cost of a printer and you have a complete system for around £500, equally suitable for home computing and small-scale business purposes.
- CP/M Plus together with 128K Ram give the 6128 an important advantage over the 664: It can run the entire range of 8-bit CP/M software.
- CP/M and the extra Ram are of less interest to home computer users. But features like its excellent Basic and graphics are enough to make the 6128 superior to most other home computers on the market; and, to clinch the matter, it comes with a disc drive and monitor.
- There is already a substantial amount of games software for the Amstrad and its software support looks likely to improve as more companies include Amstrad versions of their new releases.
- The 6128's only rival at the moment is the CBM 128. But although the Amstrad cannot match the CBM 128 for games software, the 6128's monitor and disc drive give it a decisive edge.

WIN AN AMSTRAD 6128

Competition



Your chance to win a 128K microcomputer plus disc drive plus monitor — all this, and it can run CP/M with its wealth of applications software too! It can only be Amstrad's 6128, exclusively reviewed this month. All you have to do is put yourself in the place of someone writing a book entitled "1001 uses of a disc drive". Dream up one thing you might use your disc drive for — it can be serious or silly — and send us a description and/or a drawing of your idea.

RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or original use for a disc drive.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

YOUR COMPUTER **COMPETITION**

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea for an original use for a disc drive to 6128 Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name _____

Address _____

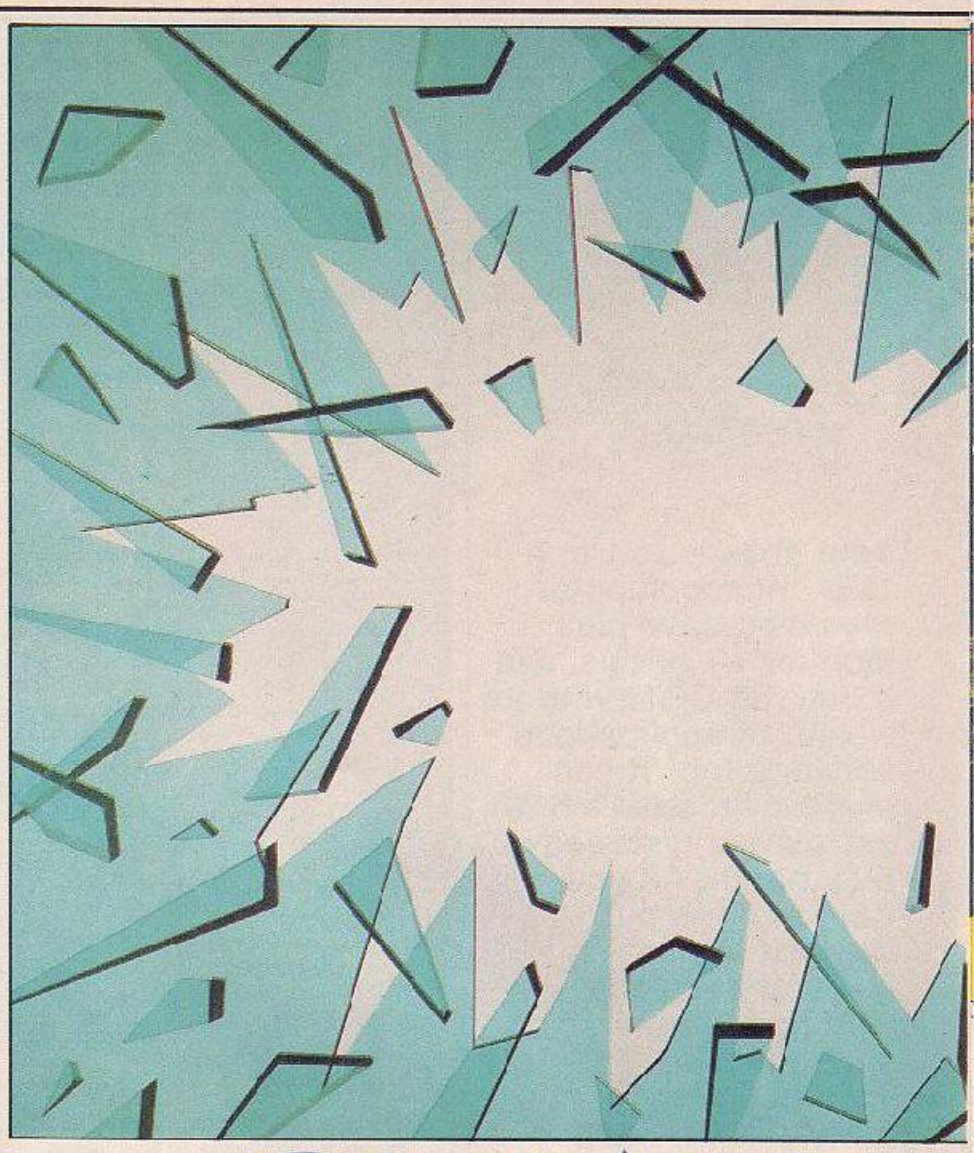
_____

Idea (written or drawn, use extra space if necessary) _____

_____

6128

Lee Paddon enters the dank and mysterious depths of a Telecom mainframe and discovers the eerie world of MUD.



MUD CHALLE

How do you recognise a Wizard? Not as you might have thought by the pointy hat, billowing gown and flowing white beard. More reliable pointers are bleary bloodshot eyes, a tendency to fall asleep, and a phone bill as big as Boris Becker's pay cheques. All these are sure signs that he is up to his eyes in MUD, or to give it its full title Multi User Dungeon.

Night after night poring over a hot modem have taken their toll. Adventure games have been around since Crowther & Woods discovered that you could do something more exciting with a computer than scare old ladies out of their wits by sending them gas bills for three million quid. They wrote Classic Adventure and thus a genre of computer games was born. The genre must now be relegated to the status of SUD, or single user dungeon. These are basically passive, and once you have solved them, however long that might take, they are consigned to the bin.

What they lack is interaction. Picking up the gem in the treasure room will always produce the same result. With MUD, all this goes out the window. It won't be just you down there. Along with the usual perils, monsters and prizes there will be up to a hundred others trying to help or hinder you. So how do you get into MUD? Your first step is to get yourself a MUD pack.

This contains a map, a security card with ID and password, instructions and 30 credits, enough for three hours. After that, its 20p per unit which lasts six minutes. Armed with this, your micro, a modem and some software suitable for accessing bulletin boards, you are all set to descend into the depths.

If this seems like an expensive way to play adventures, perhaps a brief run down on the specification might convince you otherwise. The labyrinth consists of over 1,000 locations and over 60 commands are initially available. On first entering MUD, you are a novice, your ultimate aim is to make the grade of Wizard. To make your way to the top you need experience points. You get these for killing monsters and finding treasures. You also get points for killing any fellow adventurers that you might find hanging about the place, and this is where the interactive nature of MUD starts to come into its own.

When you are in the dungeon you can ask which other players are logged on to the system. When you meet them it's up to you how you approach them. Exchange hints, team up, or just beat the hell out of each other. Another breed of animal you may meet on your travels is a mobile. This will seem like another player, you

MUD: once upon a time . . .

MUD was originally written by Roy Trubshaw at Essex University about five years ago. Ever since then it has undergone expansion and revision under the watchful eye of Richard Bartle. It quickly became a cult with the students of the university, and began to take off nationally when Essex installed PSS facilities for the computer.

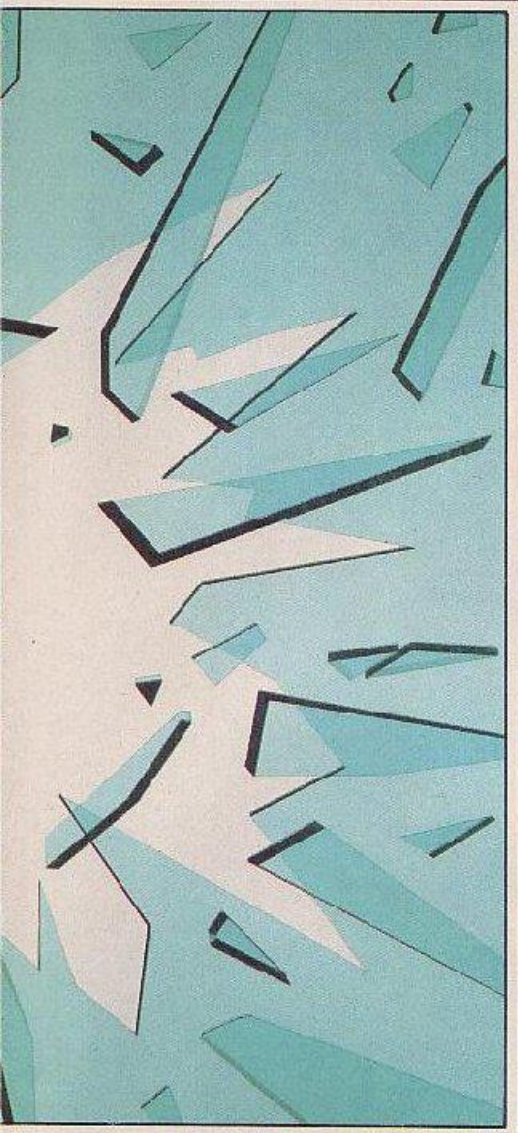
Despite access hours that meant becoming virtually nocturnal, it has become an obsession for many, some Wizards clocking up many hundreds of hours on line. As with any cult, myths have grown up around the game.

There was a craze for a time of combining MUD and Trivial Pursuit, with Wizards shouting out the questions, and right answers being rewarded with snippets of useful information. There was even a MUD wedding, between Kate, alias Margaret Lawton from Liverpool and Frobozz the Wizard. All the other characters were invited, the Christmas box was raided for suitable bunting and the wine flowed.

After the celebrations Kate & Frobozz retired to the Wizard's Chamber, and what interaction occurred thereafter is unknown.

The new improved MUD has been developed by Richard Bartle. It had first to be converted from the Dec it ran on at Essex into Mudcl, which made it machine independent, and then vastly enlarged and improved. MUD veterans will find at least some of the new MUD familiar, it incorporates the old dungeon. As time goes on, further improvements and enlargements are planned.

If you are an adventure freak, then you won't want to miss out on MUD, it'll knock the froth off your SUDS.



M.U.D

MULTI USER DUNGEON

will even be able to have an Eliza style conversation with it.

As time goes on, your experience and powers will grow. There are 60 different spells which are available to you from the word go; however, you will have little chance of successfully casting them. As your level increases, so does your chance of casting a successful spell, until you reach the ultimate level of Wizard/Witch where you are virtually immortal and all-powerful. Once you attain these dizzy heights, life becomes more a question of wielding absolute power, deciding which of the pitifully struggling Novices and Champions you will favour.

This whole anarchic system is policed by the Arch Wizards, alias the Sys-ops who keep an eye out for maverick Wizards going insane with power, and also the odd common-or-garden hacker. The ultimate in Wizard luxury is some software from Jez, author of the Demon Zrom. This gives you a separate window giving information over any player the Wizard is tracking.

Another attractive aspect of MUD is the user-friendliness of the system and the successful creation of atmosphere by the text descriptions of locations — very much in the spirit of *Dungeons and Dragons* (TM).

MUD is due to hit the fan after its official launch at the PCW show. Even better news is that it won't cost you a thing, apart from the phone costs. It will be available between 6pm and 8am weekdays and all day at weekends. This trial period will end on November 5th when the most successful MUD slingers will be invited down to the London Dungeon for a MUD spectacular.

These are promised as regular events and basically the system is locked so that no one can get in out, and then battle is joined. When the dust clears the survivor staggers out victorious. The bad news is that after the November 5th spectacular, every one will be busted down to novice level, and the battle commences in earnest, at the full rates.

Simon Dally, managing director of Multi-User Entertainments (MUSE) who market MUD worldwide, hopes that this initial trial period will get people hooked on MUD and also get any remaining bugs out of the system. Initially the system will be run from London, and there are no plans at the moment to make a Packet Switch gateway available, so would-be Wizards from the provinces might find things a bit expensive.

Simon Dally sees a rosey future for this new concept in computer games. "Our Mud development language — Muddl — will allow anyone to come to us with an idea for an interactive type of game, and Muddl will allow us to implement it quickly and cheaply. We are certainly a long way ahead of the States where Megawars III, a rather limited interactive game, is going down well, and we have high hopes of selling MUD to the Americans."

NGE

RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or clever idea for a new interactive type of game.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of BPI or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- BPI assumes no responsibility or liability for any complaints arising from this competition.

MUD COMPETITION

This month's prize is a MUD pack, plus on-line tuition from an arch Wizard on the arcane mysteries of the game. Thus equipped, you will be ready to take on nine other champions at the first MUD spectacular on an all expenses paid trip to the London Dungeon on November 5. Once there, the system will be locked, and the entrances sealed until one champion emerges triumphant. The prize for this champion of champions will be either 100 free hours of MUD'ing, or £100 cash, with free MUD time for the runners-up. For the runners-up of the *Your Computer* competition, there will be prizes from Firebird's popular Silver range of software. In return, all we ask you to do is sketch out a scenario for a new adventure which would exploit the interactive features of MUD. You must explain what features of your adventure would require the players to interact with one another. Don't forget, you'll need a computer, a modem, and appropriate bulletin board style software to play MUD.

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea, which can be written or drawn or both, to *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name _____

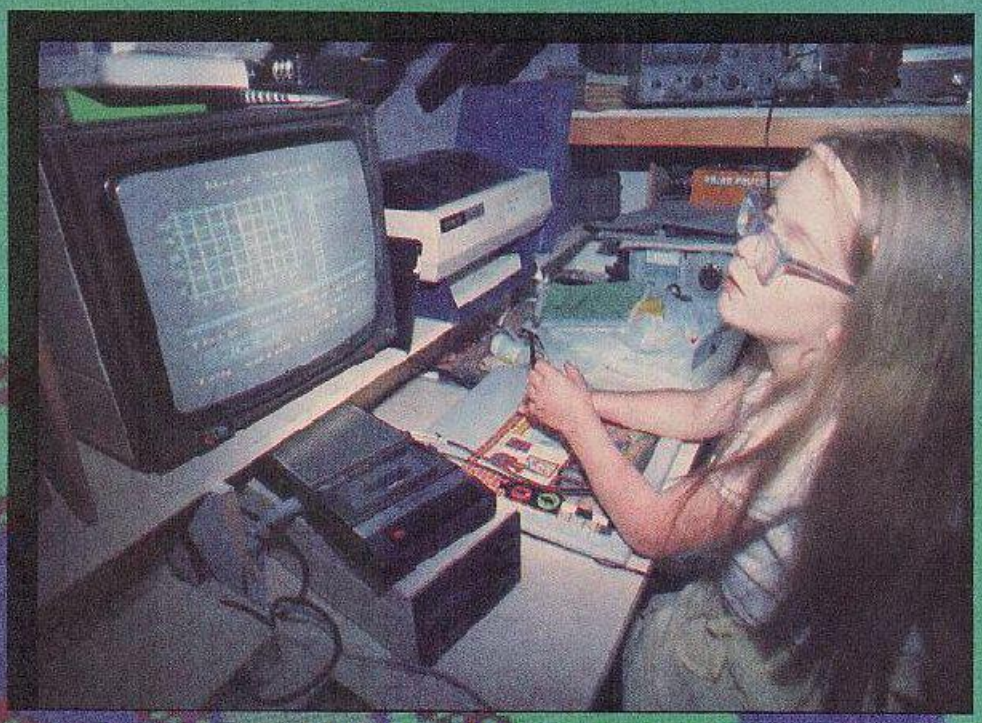
Address _____

_____

Written or drawn idea for new interactive adventure — use extra paper if necessary.

_____

_____



GRAPHICS PADS.. PENS.. DIGITISER

John Dawson trips the light pens fantastic, plus graphics pads and a budget digitiser.

ANIMATED AND still computer generated pictures are used in feature films, commercials, cartoons and advertisements. Computer assisted design is big business for architects, engineers and large computer software houses. There is a vast range of diagrams, pictures, plans and shapes that can be drawn for different purposes.

You may want to draw a two dimensional chart using bars, lines, pie segments or symbols, a circuit diagram for a piece of electronic equipment, a printed circuit board layout, a three dimensional plan for a house extension or an engineering blueprint to give to a toolmaker.

Graphpad is a graphics pad which can measure the position of a stylus in two axes and return the X and Y co-ordinates to the computer. The version of Graphpad that I examined was intended for use with the BBC micro but other versions, with different software, can be used with a number of other machines. The pad draws its power from the BBC microcomputer.

Comfortable to use

The Graphpad weighs only one kilogram and is 14 by 10.25in. with an effective drawing area of approximately 10.5 by 7.5in. The drawing area is a little smaller than a piece of A4 paper and that can be very convenient for transferring diagrams to the computer. One lead from the pad is connected to the user port of the BBC microcomputer and a second lead runs from the left hand side of the pad to a lightweight stylus or pen.

The pen is comfortable to use and has a metal tip which presses on to the perspex overlying the surface of the graphics pad. The manufacturers suggest that you should place this sheet on the surface of the graphics pad for the best results. There is a microswitch inside the body of the pen and the cursor appears on the screen of the computer VDU when the tip is pressed. If you press the pen tip when it is not pressed down on to the pad the cursor moves randomly on the screen.

British Micro supplies three programs on disc to accompany the graphics tablet. The first prints the X and Y co-ordinates of the pen on the VDU screen and the second program is a general purpose drawing program with commands to draw lines, rectangles, triangles, circles and freehand lines.

You can fill any enclosed shape or the background, draw lines in three different widths, save and load drawings to disc or tape and print a drawing in positive or negative using a screen dump routine for the Epson MX and FX series printers. The third part of the software is called a "CAD" program.

CAD stands for Computer Assisted Design. Flexible manufacturing systems are just beginning to appear in which computer assisted design is the first part of the process. After drawing something that is to be manufactured, a new washing machine for example, on the screen of a computer, it should be possible to check the strength of various components or the validity of the electrical wiring diagram using a separate computer program.

When the design has been confirmed, the computer should generate instructions to be sent to numerically controlled machine tools that will press metal panels, machine rotors and wind armatures for electric motors, weld sections of the case and lay wires in a wiring jig to form the cable harness. By changing the program that's sent from the CAD computer the product can, in theory, be turned from a washing machine into a dish washer or tumble dryer.

The Graphpad CAD program is not a competitor for the Automatic Dishwasher Designer Award 1986. It is actually quite disappointing for all you can do is design a series of shapes on a 16 by 16 grid, place these into a number of pigeonholes and then arrange the scaled down shapes on the screen linking them with lines. It is not possible to alter the scale of the shapes once they have been defined, nor can you add text to the diagram for labels or titles. Despite being able to place a grid pattern on the VDU to help with the alignment of various shapes, I found it quite difficult to drag the shapes or icons to precisely where I wanted them.

I liked the Graphpad hardware for its neat, robust design and the drawing program worked well. There is a listing of the drawing program at the back of the instruction manual and it should be easy to extend or modify this to suit your own requirements. The CAD program was disappointing.

The sensitive area of the **Touchmaster** graphics pad is exactly the same size as a piece of A4 paper. The Touchmaster is self powered by its own mains plug/transformer and must contain a dedicated microprocessor. Both serial and parallel ports are fitted to the back of the case and there is a socket for a foot switch as well. The short handbook supplied with the pad shows how it can be connected to popular machines such as the BBC micro, CBM-64, Dragon 32/64, Spectrum and Vic-20.

In the case of the BBC micro, a lead connects the touch pad to the RS-423 serial port. Unlike the other touch pads and light pens, the Touchmaster outputs X and Y co-ordinates as information that can be read as the equivalent of a key stroke in a Basic program. All you need to include in your programs are the following Basic instructions:

```
10 *FX 2,1
20 *FX 7,7
30 *FX 21,1
40 IF (GET AND &7F) <64 THEN 40
50 X = GET*64 + GET
60 Y = GET*64 + GET
```

That's really not very difficult. Accessing the RS-423 serial port is also easy in machine code if you need the whole system to run faster than is possible in Basic. Interfacing the Touchmaster is very easy and the use of the serial port may well avoid clashes with other peripherals — it is at least easier to plug and unplug leads to the serial socket than to the user port. The resolution of the Touchmaster pad is not stated in the user instructions.

Multipaint was supplied on cassette. It works well and is a lot of fun to use. Probably it's the best simple drawing program that I've found for the BBC. The program is written in Basic and can be modified to suit your own needs. Unfortunately, I couldn't get Simon's Squares to load but Word Search entranced my six year old younger daughter. The program requires concentration and as good a memory as you can manage.

The instructions contain a couple of mistakes but the bright overlay for the touch pad works well with the screen display. Spelli-copter was less successful, partly because the program requires a fiddly attention to the exact positioning of the helicopter carrying the letter you have to drop into place.

Pad has two switches

The **Saga Bitmap** is made in West Germany and plugs into an analogue-to-digital interface designed for use with the Kempston joystick on the Spectrum computer. The sensitive area is smaller than the other two pads — 5ins. by 3.75in. — but this didn't seem to make it more difficult to position the cursor where I wanted. The pad has two switches on the left hand side of the case that are used to tell the computer when you have a choice from a menu or set the cursor correctly in place.

The Touchmaster pad is set up with two soft "keys" at the bottom right side of the drawing area when you are using Multipaint and the Graphpad device requires you to press keys on the computer keyboard. I preferred the Touchmaster approach because you can concentrate on the pad and the screen without being distracted by the keyboard or a separate switch. Nevertheless I liked the consistency and feel of the Bitmap pad while I was using it with the **Saga Style** program.

Style can be used with either the Bitmap or a joystick. The program can be transferred to a Microdrive. It has all the usual facilities for drawing lines, rays — multiple lines from a single point — circles, triangles, boxes, freehand shapes and freehand points. You can fill any enclosed shape and can unfill the shape if you make a mistake.

The most advanced facility allows you to zoom into a section of the picture, alter individual pixels and then zoom out again. Other utilities provide for solid or shaded fill, localised or universal colour changes and two different brush types.

The Touchmaster Multipaint program has more brush styles and widths and will draw regular polygons with between three and nine

EQUIPMENT AND SOFTWARE MANUFACTURERS

GRAPHPAD — BBC
Supplied with:
- XY coordinates program
- Drawing package
- CAD program

British Micro, Penfold Works, Imperial Way, WATFORD, Hertfordshire WD2 4YY
Telephone: 0923 48222

TOUCHMASTER — BBC, Spectrum, CBM-64, Vic 20, Dragon
Supplied with:
- Multipaint drawing package

Also supplied for review:
- Spelli-copter, Simon's Squares, Word Search

Touchmaster Ltd, P.O. Box 3, Port Talbot, West Glamorgan SA13 1WH
Telephone: 0656 744770

SAGA GRAPHICS PAD — Spectrum
Also supplied for review:
- Style

Saga Systems Limited, 2 Eve Road, WOKING, Surrey GU21 4JT
Telephone: 04862 22977

DATAPEN — BBC, Spectrum
Supplied with:
- SKETCH — Drawing program
- SHAPE
- INTRO

Also included for review:
- DEFINE — Sprite designer and animator
- BRITAIN — Map of the UK with questions and lightpen answers
- CIRKWIK — a program for drawing electronic circuit diagrams

Datapen Microtechnology Limited, Kingsclere Road, OVERTON, Hampshire RG25 3JB
Telephone: 0256 77084

PLOTMATE — BBC
Supplied with:
- Main system disc and utilities
- Demonstration character set and 'enter data and plot program'
- Vibrating string displacements
- Rainfall chart
- Function keys reminder
- Map of Britain

Also supplied for review:
- LINCAD — Technical drawing package
- LINTRONIC — Elcotronic circuit diagram plotting program
- LINCHART — Bar and pie chart program for plotting flat and 'solid' charts

Linear Graphics Limited, 28 Purdeys Way, ROCHFORD, Essex SS4 1NE
Telephone: 0702 541664/5

ANIROG SUPER SKETCH PAD — CBM-64
Supplied with:
- Super Sketch starter kit

ANIROG, Unit 10, Victoria Industrial Park, Victoria Road, DARTFORD, Kent DA1 5AJ
Telephone: 0322 92513/8

LEONARDO — Spectrum
Graphics package
Creative Sparks, Thorn EMI Software

sides. These things apart, the two programs are very similar. Unlike Graphpad, neither will dump a drawing to a printer.

The **Anirog Super Sketch — Model G2100** works on different principles to the graphics pads that I have described so far. A long arm protrudes over the drawing area from a housing at the top of the pad. The position of the stylus at the end of the arm is calculated from the rotation of two potentiometers inside the housing. The arm has a geared track underneath and this provides information about how far the stylus is up or down the pad while the rotation of the arm provides the other signal. Buttons on the top housing can be used to Select a function from a menu displayed on the VDU, "Lift" the pen from the pad — electronically at least — and return to the Menu. The software supplied with the Anirog sketch pad works well and has a couple of unique features.

"Undo" will erase the work you have done since the menu was last displayed and "Mirror", "Quad" and "Flip" will split the screen and copy what you are doing either to the other side, into the three other quarters, or from top to bottom. That's a good way to achieve symmetrical drawings and the undo command is much easier to use than the erase functions in most of the other packages.

I didn't like the mechanism in the Anirog sketch pad particularly after using the Bitmap and Touchmaster graphics pads. I would be concerned about wear developing in the gear mechanism that turns the potentiometers and the steadiness that you might appear to gain from the arm as opposed to the free pen didn't help my two children to draw straighter lines.

However, the Anirog sketch pad works perfectly well and the drawing package is perfectly adequate for designing pictures and saving them on tape or disc. The manual suggests that photographing the screen is one way of reproducing what you have created.

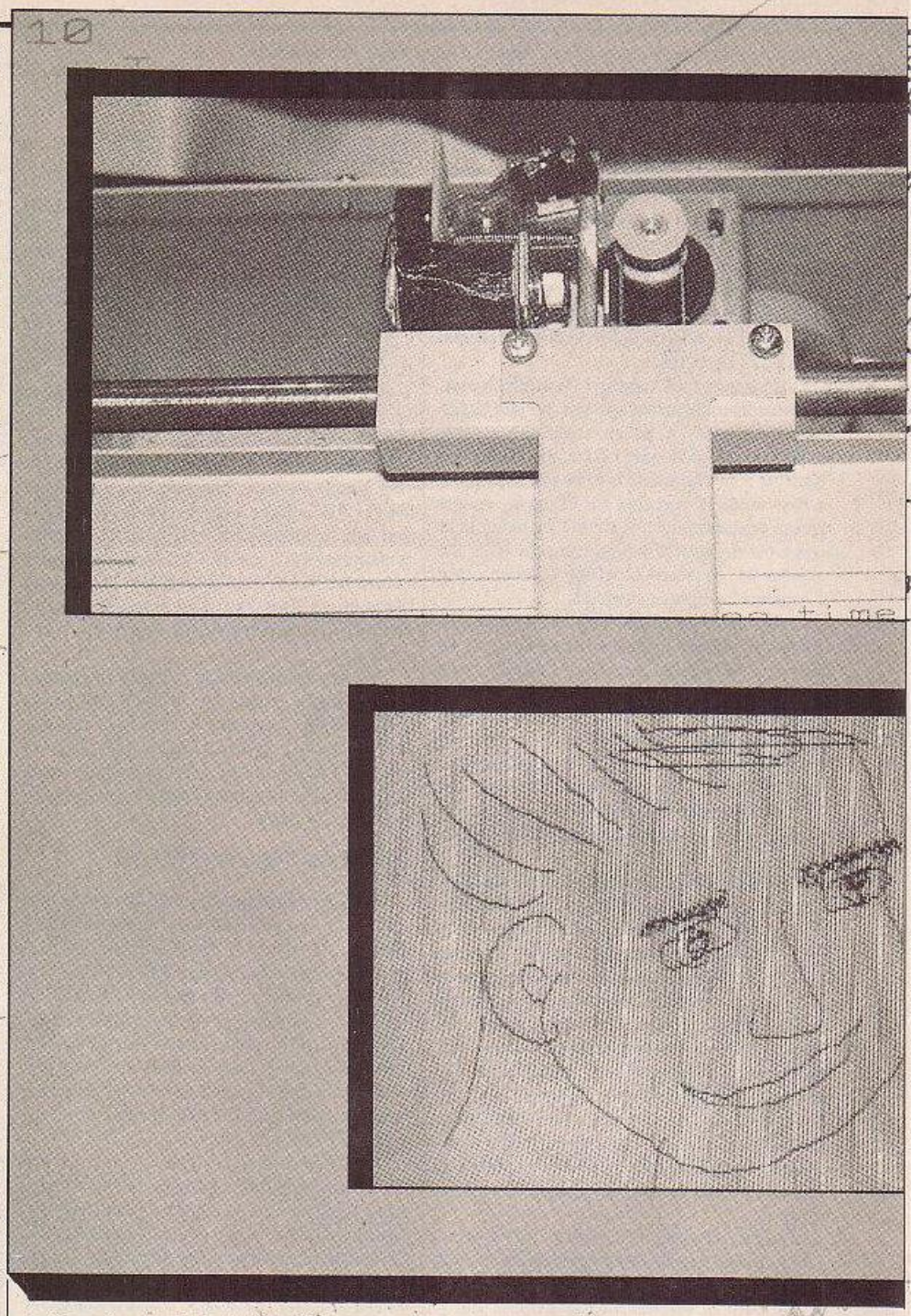
Well made unit

A light pen is a device which detects when the spot of light on a scanning visual display unit — an ordinary TV or monitor — has passed underneath the sensor. In conjunction with software or hardware, the CRTC chip in the BBC micro, the position of the lightpen on the screen can be determined and the information fed into a program running in the computer.

The **R H Lightpen** is a well made unit. The body of the pen is a slim, comfortable to hold, cylinder with a red LED at the back of the pen — facing the user — and a tapering nozzle at the front. A flexible lead connects the pen to a metal cased unit that connects in turn to the analogue port of the BBC microcomputer.

The software included with the R H Lightpen consists of a number of procedures that can be incorporated into your own programs in addition to two good games which are played with the lightpen. The drawing routine works in Mode 0 and is much simpler than the software provided with other products. However, R H Electronics also produce a program known as Art Master.

Two versions of the **Datapen** were sent for review. One connects to the A to D port on the BBC microcomputer and the other is connected to a socket which plugs into the bus on the back of the Spectrum. It is not possible to plug another unit on to the back of the Datapen connector — it must be the last item in the stack. The Spectrum version of the pen can be used with both the 16K and 48K computers although the programs to save a picture to tape and load it back in again have to be loaded separately if you have the 16K machine.



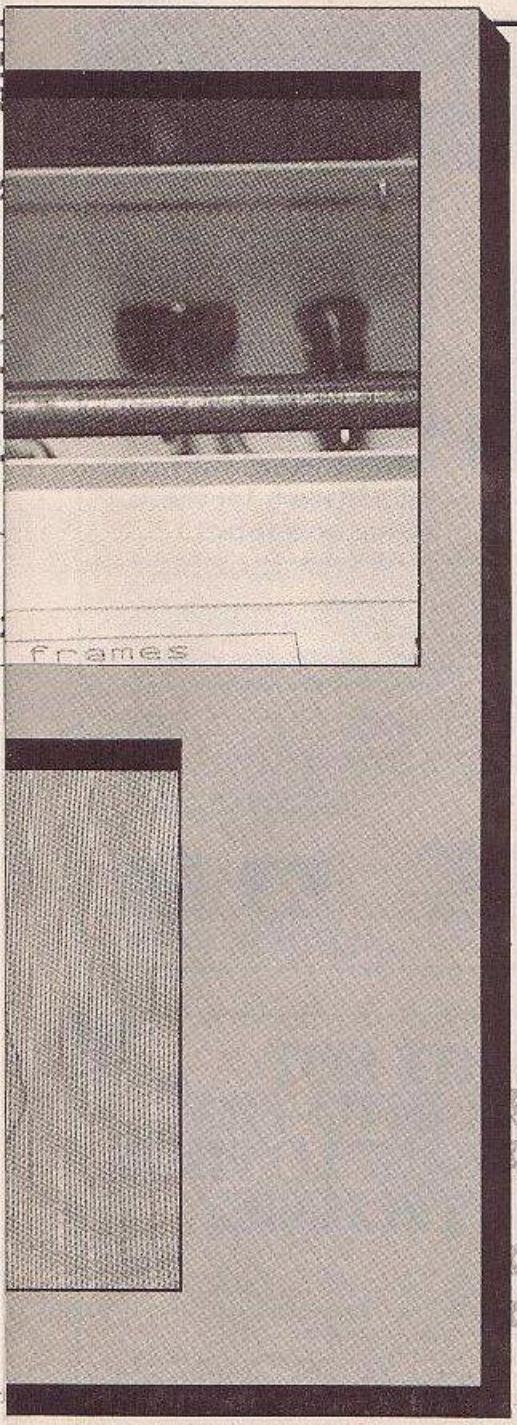
A lot of software was supplied with the Datapen. You can create teletext screens, animate sprites — this is great fun — play a quiz about the British Isles and draw pictures. Cirkwik is a disc based program that allows you to create circuit diagrams for electronic, hydraulic or pneumatic circuits, flow diagrams or any other drawing that requires only symbols and lines drawn at rightangles.

Multiple screens can be linked together to produce a diagram four screens wide by two screens high and up to 640 different symbols can be used in the course of preparing a diagram. Cirkwik is really rather like a graphics word processor in which symbols are placed in position and linked by lines. If you change one symbol in the symbol table, each occurrence of the symbol in the diagram will also be altered.

The **Plotmate** plotter is a delight to use. It is a flatbed plotter where the pen is moved in two dimensions. Other machines, the Epson HI-80 for example, move the pen in one dimension and the paper in the other. The Plotmate will handle card or thick paper that will stop the Epson dead in its tracks. The penalty is the Plotmate's greater size — 15 by 14 by 6.5in.

The Plotmate is very solidly constructed with a steel case that will take a lot of wear and tear. The plotting mechanism reminds me of the standard of manufacture you find inside a commercial Qume or Diablo daisywheel printer — intended for continuous use over prolonged periods. Despite this reassuringly massive feel, the Plotmate weighs only 6.5 Kilograms.

There's so much you can do with the Plot-



mate that it's impossible to cover it all in part of one article. I hope to write about the Plotmate in much more detail later in the autumn. However, for the moment here is a selection of the facilities that come with the basic machine:

- The VDU 23,255 instruction can change the logical colour on the VDU and can be used to prompt the user to change the pen colour in the Plotmate. Black, Red, Green, Brown, Blue and Violet pens are available.
- Text can be plotted in different sizes, orientations — up, down, left to right and right to left — and four different slants — italics. The VDU 23,255 instruction accepts parameters to modify the character height, character width, character slant, character orientation, pen speed, shading and broken line patterns and scale. One more parameter controls functions such as upside down plotting, setting the plotter origin and toggling the colour change prompts.
- You can fill triangles and other blocks quite automatically with either solid colour or a large variety of less dense or broken lines.

Plotmate gets its data by intercepting the commands in the OSWRCH channel and sending them on afterwards to the BBC micro operating system. One version of the plotter driver is designed to be located just below the Mode 4 screen RAM, another leaves more room for your Basic program but does not permit simultaneous plotting on screen and to the Plotmate.

You can run the Plotmate driver with the second processor leaving all the secondary Ram free for your programs. The Plotmate driver can be loaded from within a Basic program when you require it by simply changing HIMEM and using the instruction

```
*RUN H.PLTMATE
```

Finally, you can directly access routine to move the pen, and generally control the plotter in both Basic and machine code.

The figures show how a screen display can be transferred to the plotter. The programs to produce both diagrams are standard Acornsoft software from the Creative Graphics and Graphs and Charts packages run with Plotmate in operation. The map of Great Britain and the circuit diagram were produced by demonstration programs supplied with the plotter.

The **Print Technik Digitiser** is a small box that plugs into the user port of the CBM-64 computer. The digitiser works by sampling a number of video frames and building up a picture in four levels of brightness in the computer memory. The stored picture is 256 by 256 points in size and 150 by 200 points are visible on screen at any one time.

You can assign different colours to each of the grey levels and can run a separate program to resolve 16 levels of brightness for special purposes. Once a picture has been acquired by the digitiser, the device can be disconnected from the computer and the image manipulated by the software alone.

The image can be dumped to black/white and colour dot matrix printers and may also be 'edited' using a light pen. Another program in the package will detect a change in the digitised image and sound an alarm if certain parameters are exceeded. The Print Technik digitiser was easy to set up using a Panasonic A2 camera and Panasonic NV 180B video recorder as the signal source.

The pictures were clear although the camera and the object must both be kept stationary as the digitising process takes three or four seconds to complete. It's very clever and a lot of fun.

There is one graphics package for the Spectrum that doesn't cost a lot of money and is more sophisticated than the other drawing software included in this review. **Leonardo** can draw in three dimensions and has a 'programmed draw' facility for drawing patterns, shapes, singly or repetitively, with scale expansion, translation or rotation. The rotation increment can be set to any number of degrees unlike many other programs which cope only with rightangle changes. Leonardo will work with the keyboard alone or any of the popular Spectrum joysticks.

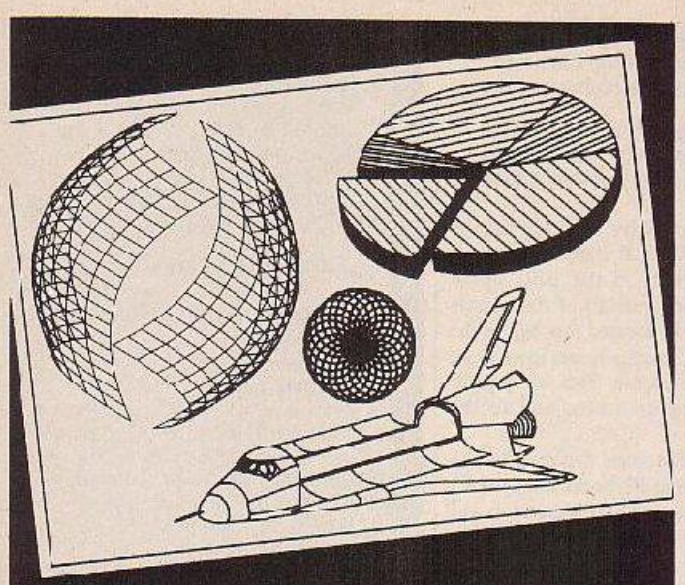
PRINT TECHNIK VIDEO DIGITISER CBM-64
Supplied with:
Program suite to capture video picture, edit the picture, store picture on disc, dump a picture to dot matrix printer
CRL Group PLC, CRL House, 9 Kings Yard, Carpenters Road, LONDON E15 2HD
Telephone: 01-533 2918

R H ELECTRONICS LIGHT PEN BBC
Supplied with:
Light pen utilities
Draughts game
Kwartet game
Mode 0 free hand drawing program
Swan — Mode 2 picture
R H Electronics (Sales) Limited, Chesterton Mill, Frenchs Road, CAMBRIDGE CB4 3NP
Telephone: 0223 311290

COMPUTER ART AND GRAPHICS — How to program with personal computers
Written by Axel Bruck
Published by Paul Petzold Limited London (1984) ISBN 0-946970-06-8

CONCLUSIONS

- A lot of software has been written for onscreen graphics displays on most of the popular microcomputers. Plotmate can use those programs directly to transfer data from the BBC screen to the plotter.
- Graphics tablets or pads have been available for some time for minicomputers and big, serious jobs. Until recently they came with big, serious prices attached to them so the Graphpad, Touchmaster and Bitmap are all good value for money as peripherals.
- Leonardo is the best drawing and painting program for the Spectrum and you don't even need a joystick or a graphics pad.
- Axel Bruck's book *Computer Art and Graphics* is superb. It illustrates magnificently how a computer can be used to draw complex repetitive patterns that appear to have depth and perspective. The explanation and programs in the book can be adapted to draw and plot almost any shape. But that is done by entering figures that describe the various lines and movements necessary to construct the shape. None of the software included in this review will allow you to draw a diagram in three dimensions on the computer's screen with either a graphics pad or a light pen and then rotate or scale the figure to suit your needs.
- The video digitiser could be useful for preparing sales literature or catalogues where you want to include a picture of a piece of equipment or a logo into the middle of a text. It is certainly great fun to play with but remember you'll need a standard source of video signals, an ordinary video camera for example, to feed the device.
- For my purposes I would buy an R H Electronics lightpen or the Graphpad or Touchmaster graphics pad and couple that to the Plotmate, writing the software to manipulate the data with the help of Axel Bruck's book.



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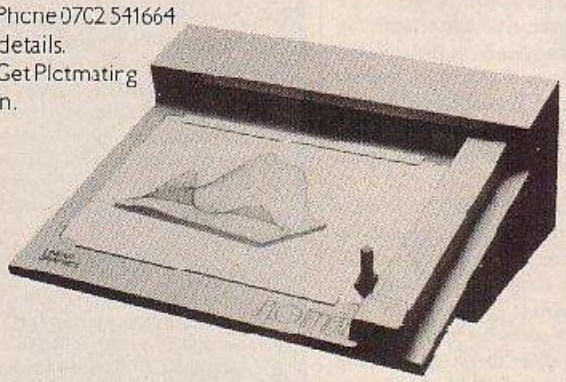

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EDUCATION: REPLACING TEACHER

Software or swotware? Josephine Adams' end of term report reviews the class.

WHAT MAKES A good piece of educational software? Ask 20 different people and you'll get 20 different answers. To the parent, it has to help their children be better scholars and get a better job. To teachers it adds something to their task that would otherwise be difficult, impractical, or even impossible. To the kids, it makes what is usually boring a bit more fun. To the supplier, well, the educational label can give an indifferent program credibility and so possibly greater sales. But unfortunately to most people, it means very little at all!

1981 marks the beginning of the computers in education boom. With government help, schools started to equip with micros, namely, the BBC — plus the Research Machines' 380-Z and 480-Z with a few Spectrums to boot.

Unfortunately, the software of that era did more than anything to put teachers off using computers — not that many of them were keen anyway. Chalk and talk could achieve much better results than most educational software of the day. In retrospect, it was asking too much for it to have been otherwise.

Programs performed on screen what the teacher did in class — except not as well. The dreaded drill and practice program dominated: the computer asks a question, the children answer it and, if they're lucky, receive a graphical reward sequence — a big screen tick.

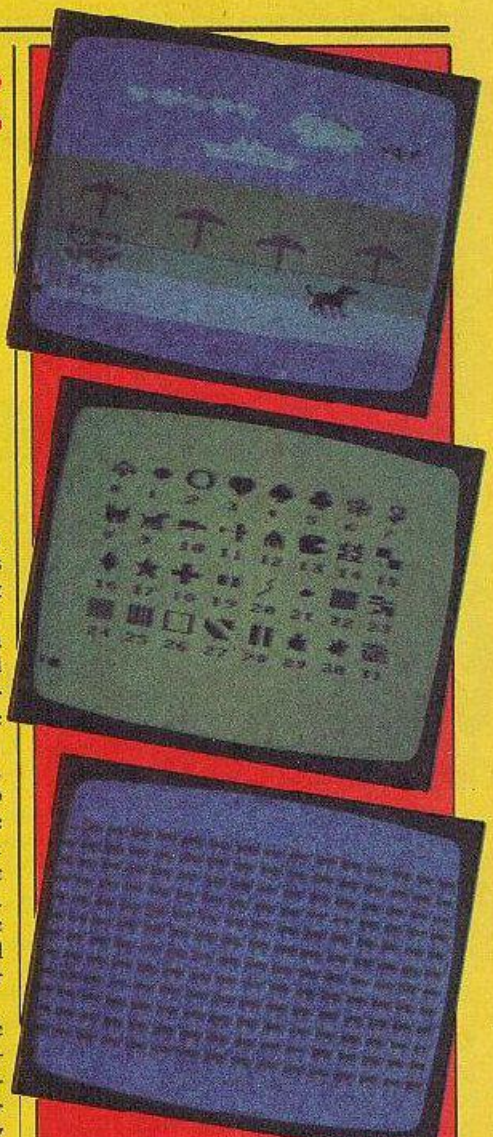
But the situation has improved, dramatically. Over the past year or so, teachers and suppliers have got together to develop some very exciting applications.

Lessons have been learned: the computer can do some things well — not everything — and these areas have been exploited. Where educational software has succeeded, the results have been spectacular.

Consider these examples: remedial English. The mechanical ability to write is not there so the creative expression has dried up and the desire to learn with it. Enter word processing. Perfect hard copy every time thanks to a few basic functions — insert, delete, search and replace. The BBC Micro, currently the standard machine in education, supports quite a few good word processors, though none better than Computer Concepts' Wordwise Plus.

Or, history. How can you get a real feel for life in the Viking era? Enter the historical simulation. Decisions have to be made based on conditions of the time — the outcomes of which have no less significance in the 20th century than they did in the 10th. In case you're wondering, there is in fact a wonderful program from Fearnleaf called The Vikings.

Let's stay with the humanities and take a look at geography. One of the best collections comes from BBC Publications, called Introducing



Logotron Logo and sprite creation. Top, arcade graphics using simple Logo commands. Middle, this Logo can handle up to 32 sprites at a time. Bottom, multiplying cats.

(continued on next page)

WARNING: COMPUTER STUDIES CAN DAMAGE YOUR FUTURE!

One: a home computer is not really going to help youngsters get a job because all they want to do is play games. Nothing wrong with that: there are some marvellous games around and the entertainment aspect of the computer at home is its main appeal.

Two: computer studies as taught in the majority of schools is almost completely irrelevant to what goes on in the real world. That, I hasten to add, is not the fault of the teachers but the exam boards. Whether the O or A level computer studies candidates go into higher education or employment, they will have to unlearn what they have acquired so far and then tackle what is being asked of them.

Employers rarely want Basic programmers; they want people skilled in Cobol, Fortran and assembly language. Universities and polytechnics don't give a hoot for Babbage; they demand a working knowledge of Winchester hard-disc systems, protocols for computer communication, user-friendly software interfaces...

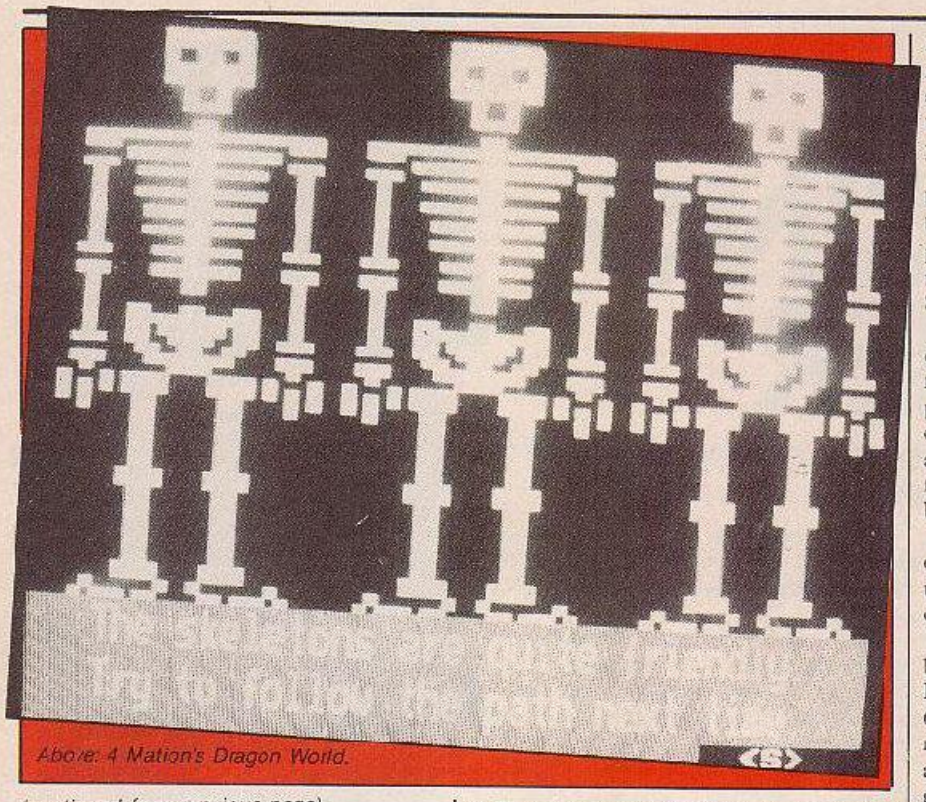
Three: social interaction, organisational skills, people management are all more important than the vast amount of technical knowledge believed to be necessary when working with computers. A number of educationalists are becoming rightly concerned with the computer junkies, the increasingly common place of youngsters becoming hooked and ignoring everything else in life. If you can't communicate effectively with other people, you will be seriously hindered in your working life, whatever you choose to do.

This is not meant to be pessimistic, just cautious. High expectations more often than not end up as disappointments.

One step in the right direction is the increasing number of training centres of one description or another which attempt to meet specific needs above and beyond conventional educational institutions. ITeCs (Information Technology Centres) are springing up all over the country and provide courses for predominantly unqualified 16 and 17 year olds in various aspects of computers from viewdata editing to word processing.

Within schools themselves, an initiative has been introduced by the DES to cater for the broad range of skills required within the hi-tech industries ranging from compter-aided design to electronic engineering. This is the so-called TVEI scheme or Technical and Vocational Education Initiative.

A skills shortage undoubtedly exists where jobs remain unfilled because so far inadequate attention has been paid to meeting industry's requirements. Those jobs are not for programmers but for creative technical people: I've seen many primary school children with the potential to meet those needs, if only Rank Xerox, ICL and others can wait 10 years or so!



Above: 4 Mation's Dragon World.

(continued from previous page)

Geography. Four programs take you through different aspects of the subject via simulations of a nomadic lifestyle, an expedition to Everest, a river journey and an airline flight: all first-class learning material.

Maths has always been considered an appropriate subject for the computer. For the early years of school, there are a couple of outstanding programs that are a must for any primary school software library. The first is called Maths with a Story (BBC Publications); the second is Cars — Maths in Motion from a highly respected educational software supplier, The Cambridgeshire Software House.

But computer assisted learning aside, there are new opportunities for learning that the computer and its software have created. This is the real breakthrough.

One example, and perhaps the best, is Logo. All the common home computers have an implementation of Logo though the better ones are Logotron Logo for the BBC Micro and Atari Logo.

Logo basically offers the young computer user the chance to explore for themselves the world of maths, programming, computer graphics and control. In school, it can form the basis of a year's work; at home, it means hours and hours of fun — much more so than the average game. And it's very educational!

Another example is information handling. Success in this world depends on the individual's ability to manipulate information not to store it: to find it, collect, retrieve and interrogate it. It is here that being able to use a computer may help its user to get a good job.

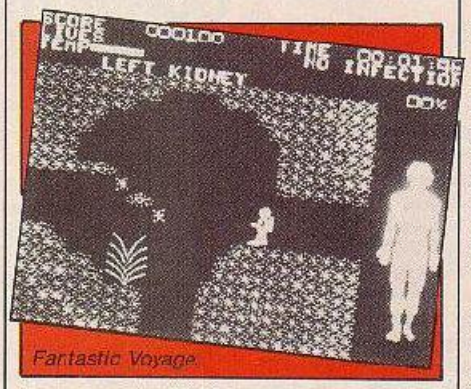
Forget programming, systems analysis and computer science; computers will soon be able to do all that for themselves. What is important is the information handling skill — the heart of the information technology boom.

It is here too that the computer fits most comfortably into other, more familiar, areas of classroom activity. Kids go out daily to survey traffic, wildlife, the eating habits of classmates and a thousand other things as part of normal project work. The creation of a database on the computer of information they have gathered can help this kind of project work but it is also a marvellous learning opportunity in its own right.

Two of the best educational database packages are Quest from the Advisory Unit of Computer Based Education (AUCBE) in Hatfield and Inform from the Nottinghamshire Computer Education Centre. The first runs on RML micros, the second on the Beeb.

In the primary school, adventures have proved to be enormously successful learning aids. Children work together in groups, share decision making responsibilities, delegate tasks — all very important aspects of a later, working life and things all too often neglected in exam-dominated syllabuses.

The spin-offs too are tremendous — creative and written work, even drama and music. With



Fantastic Voyage.

an average ratio of 20 kids to one computer, these associated activities are extremely important. The maestro in this field is 4Mation Educational Resources: little has generated as much enthusiasm or fun as Flowers of Crystal and Dragon World.

Another good example of an educational adventure is GSN's program called Merlin's Magical Shop. Within the package, you'll be hard-pressed to find the software. There's so much additional resource material, teaching suggestions, children's worksheets, documentation, etc. Really makes you feel you're getting your money's worth.

Helping to appreciate the natural world may be the last thing you would imagine the micro being any good at. But there are two brilliant pieces of software that do just that — Osprey from Bourne Educational Software and Suburban Fox from Ginn & Co.

In one, you just protect the precariously small osprey population in the highlands of Scotland from threats ranging from nosy tourists to natural predators. You really begin to understand what conservation is all about and what it's like to be an osprey. Surburban Fox takes the process even further — you take on the role of a fox: you live, breathe and survive as a fox.

All the software monitored so far is purely educational in the sense that it was designed for use in the classroom. But what about home education?

Well, home education software took off in the boom period when millions were rushing out to Laskys and W H Smith to buy their Commodore 64s or Spectrums. Making learning fun made money for suppliers like Mirrorsoft, Longman and Macmillan who all brought out some pretty good programs.

Other names also cashed in on the market with predominantly early learning games for the seven to 12 age group. A few braved the exam revision market like Collins and Penguin, but the majority of material was for the younger age group.

One of the few companies to remain successful in this field is ASK. Time Trucker, Podd and the latest in the line — Pazzazz — are all top quality programs. There are plenty of others too. There are versions of ASK software for most micros and at a reasonable price.

A couple of other good examples of, er, well, interesting software are Bodyworks and Fantastic Voyage. Remember the pop-up body book with the flapping lungs? Well, Bodyworks is an adaptation of that written in conjunction with Jonathan Miller. Available for the Spectrum, the graphics are tremendous. Both apply to Fantastic Voyage too — a similar program to Bodyworks but with much more of a game approach. Both will undoubtedly spur budding biologists to greater heights.

This represents but a small selection of what is on the shelves that is good and worth buying. But what will the next generation of educational software bring? One thing is for sure, it will have to be good to sell. Teachers and parents will soon acquire the confidence to discard what they know is rubbish and to demand what they know to be good; not only in terms of software but curricular and applications too.

Curriculum development — changes in what is taught in schools — is a slow, slow process. For the computer to be utilised to the full, the curriculum must change. It's beginning to happen slowly but surely in the form of new courses and qualifications. Take for example the diploma in microcomputer applications which is now being offered at a number of schools and colleges.

From Babbage and Basic, we've come to viewdata and spreadsheets — practical useful subjects with a real application to the outside world: a rare enough thing in schools. Courses of this type

have identified and addressed particular needs in the commercial world and in the pupils themselves. They are modular by design and combine applications such as word processing, database, financial analysis, graphics, videotex, etc., and upon successful completion are worth much more than the average clutch of O levels and CSEs. They also demand a new approach to educational software.

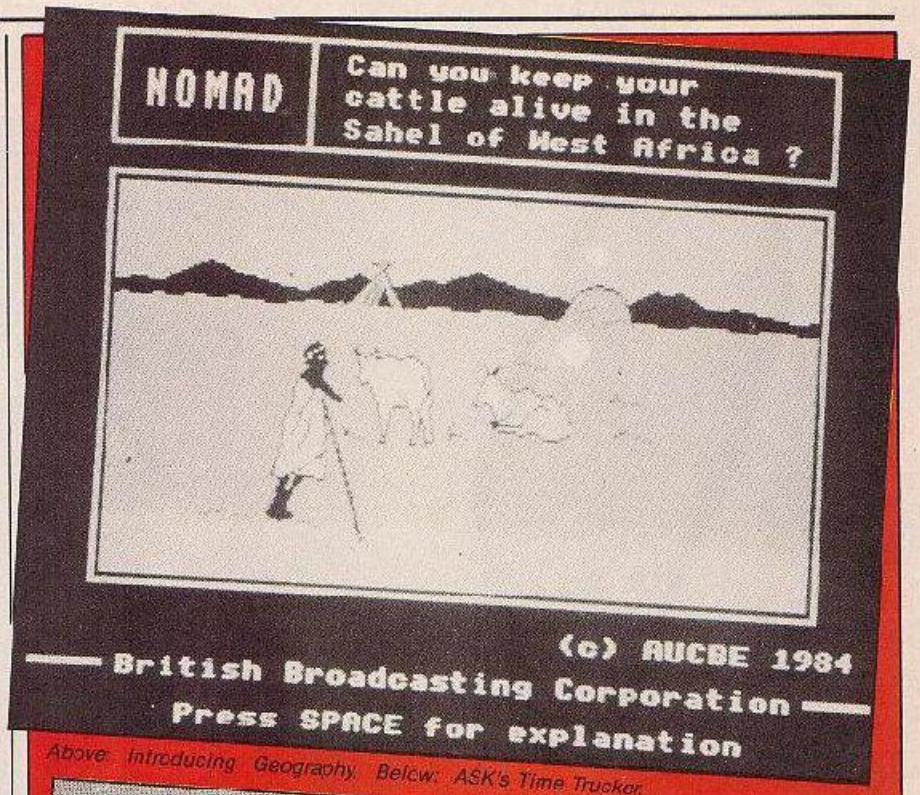
This brings us really to one of the major new developments within the educational field and elsewhere — the availability of cheap 16-bit computers. This combats two of the restrictions of current activities. The first is that working on machines like the RM Nimbus and Apricot FIE has direct relevance to industry where the same if not very similar machines are being used. So when you learn about word processing or databases, you're learning on the same machines with the same software as is in commercial use.

Also, writing decent, interesting and extensive educational software on the BBC Micro is not easy, as any software house will tell you. The machine is just not up to it. But with whizz-bang 16-bit graphics, speed and performance, developers will really be able to get their teeth into applications.

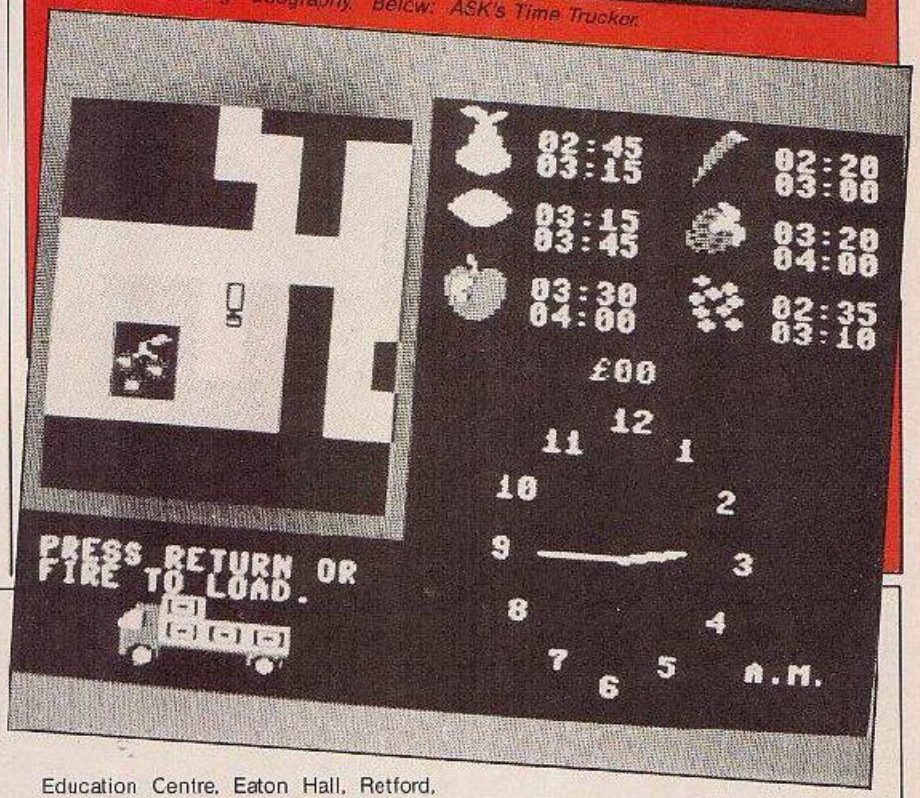
16-bit computing with its icon technology, high-speed graphics, large memory capacity and most important, ease of use, adds up to better software, better applications and a better learning environment.

What look like being the final push from MEP — the quango set up in 1981 to oversee educational computing — is in the area of 16-bit educational software development. Recently, a contract worth £25,000 was awarded to ASK to develop material for use in schools. If the company's present range of programs is anything to go by, the end result should be pretty good.

There are many scenarios for the school of the future but one of the most feasible is the increased amount of time pupils will study at home. A micro at home connected by phone to a larger computer elsewhere is a realistic possibility for home study. Many students with special educational needs use this kind of set up to undergo study because they simply can't attend school or college. If this became commonplace, we'd really see some advances in home education software.



Above: Introducing Geography. Below: ASK's Time Trucker.



Software and Suppliers

Wordwise Plus Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX, BBC micro, £56.35, Rom.
The Viking, Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH. £35.95,
Introducing Geography, BBC Publications, 35 Marylebone High Street, London W1M 4AA, BBC micro, £17.40 disc
Maths with a Story, BBC Publications (see address above), BBC micro, £9.95 cassette
Cars — Maths in Motion, Cambridgeshire Software House, The Town Hall, St Ives, Huntingdon, Cambs. PE17 4AL, BBC micro, £18 cassette and disc
Logotron Logo, Logotron Ltd, 5 Granby Street, Loughborough, Leics. LE11 4DJ, BBC micro, £39 Rom chip.
Atari Logo, Atari UK Ltd
Quest (QuestD), AUCBE, Endymion Road, Hatfield, Herts. AL10 380-Z and 480-Z, £10 disc
Inform, Nottinghamshire Computer Education Centre, Eaton Hall, Retford, Notts., BBC micro, £15 (check) disc
Flowers of Crystal, 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ BBC micro and 480-Z(?), £16 cassette £17.65 disc
Dragon World, 4Mation Educational Resources (see address above), BBC micro, RML version in preparation, £16 cassette, £17.65 disc
Merlin's Magical Shop, GSN, Manchester University Press, Oxford Road, Manchester M13 9PL, BBC micro and 480-Z, £25 disc
Osprey, Bourne Educational Software, Bourne House, The Hundred, Romsey, Hants SO5 8BY. £11.95, disc
Surburban Fox, Ginn & Co. Ltd, Prebendal House, Farson's Fee, Aylesbury, Bucks. HP20 2QX. £30
Podd, ASK Ltd, London House, 68 Upper Richmond Road, London SW15 2RP. BBC micro, £9.95 cassette
Time Trucker, ASK Ltd (see address above), Commodore 64, £7.95 cassette
Pazzazz, ASK Ltd, (see address above), Commodore 64 and BBC micro, cassette
Bodyworks, Genesis Productions Ltd, 30 Great Portland Street, London W1N 5AD, Spectrum, £14.95 cassette
Fantastic Voyage, Quicksilva Ltd, Carlton Lodge, 16 Carlton Crescent, Southampton, Hants. SO1 2EJ, Spectrum, £6.95 cassette

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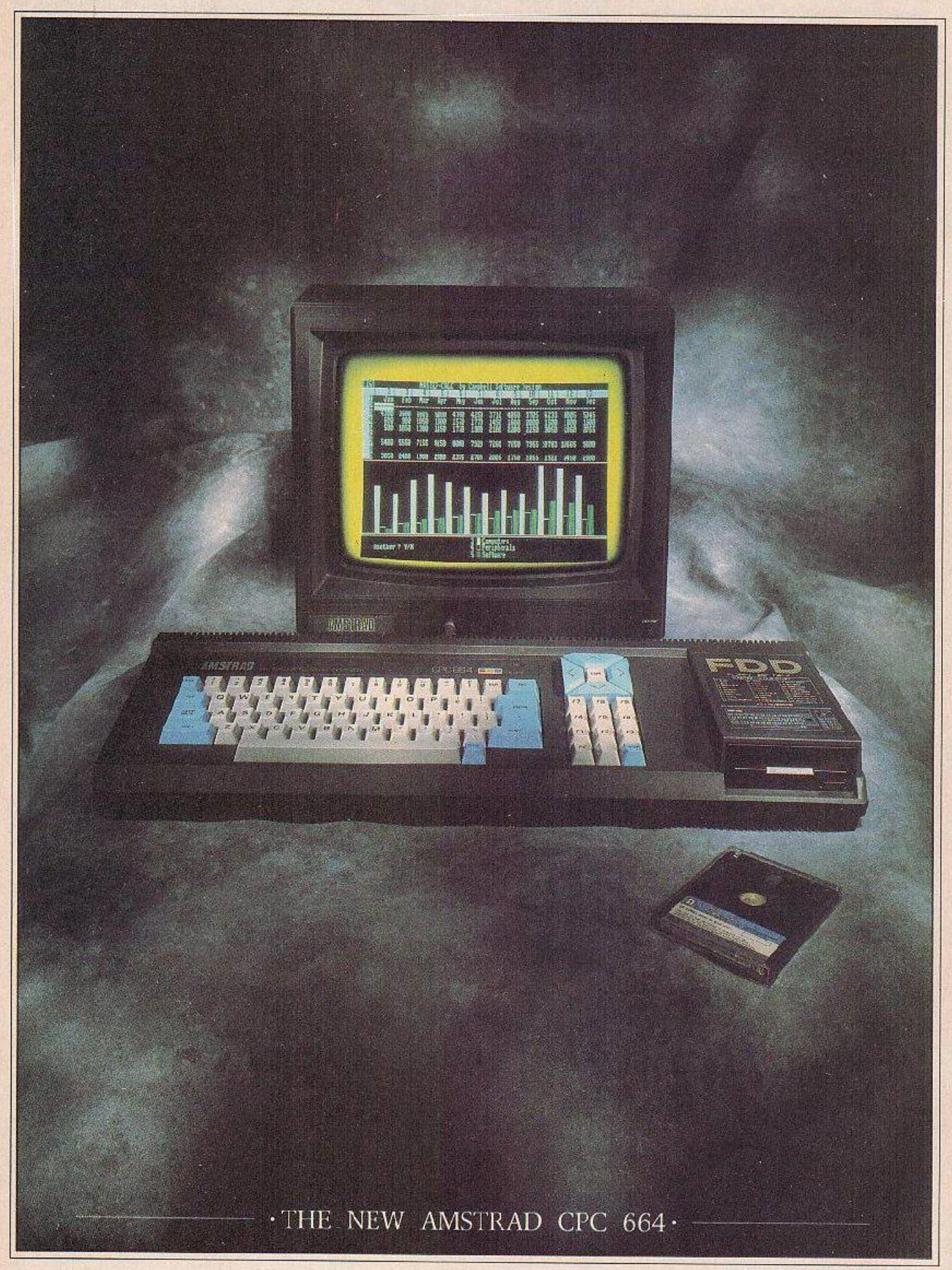

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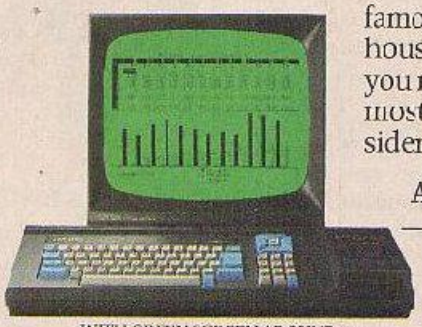

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The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.

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These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

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INSIDE

Sneak screen shots of the next batch of games from Britain's biggest selling software house. If it's so simple for U.S. Gold to scoop the best of America's games how come no-one else beats them to it?

WITH JUST four full-time staff you could call U.S. Gold a Mickey Mouse company. And now that Geoff Brown has acquired the rights to Walt Disney productions — outbidding multi-billion dollar corporations like British Telecom along the way he just might agree with you.

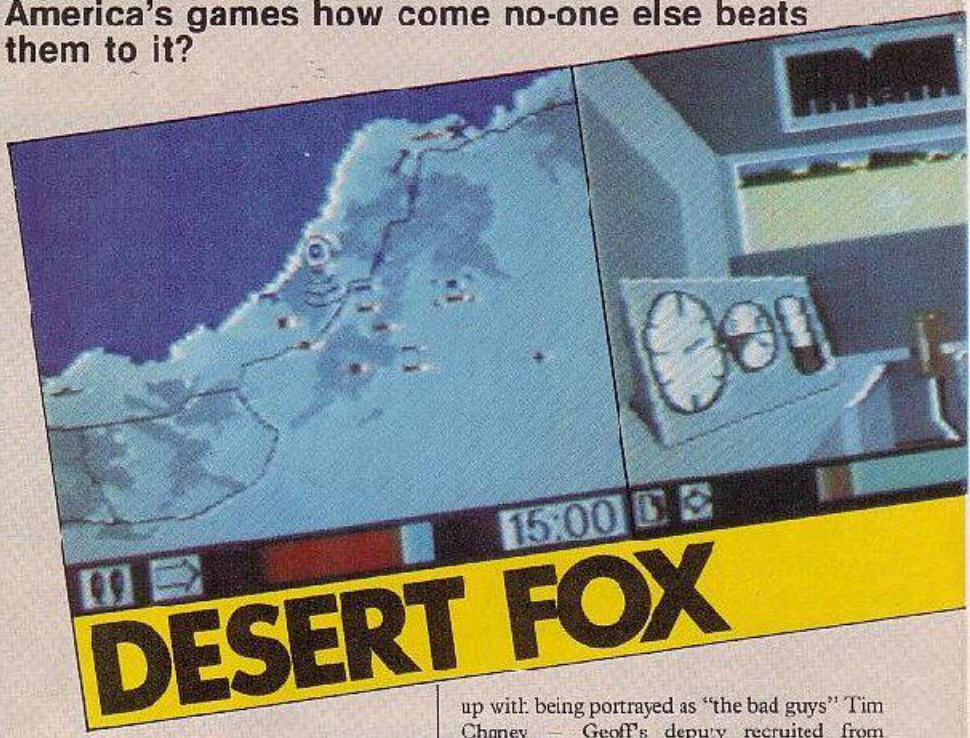
In a year and a half since Geoff and Anne Brown formed U.S. Gold they have launched one title every ten days, selling a million cassettes and taking much the biggest share of the British software market. Even their bitterest critics, and they have many 'they like to knock success" claims Geoff "success breeds jealousy", admit that the invasion of American software has forced up the minimum acceptable standard for programs.

Geoff, a former Maths teacher and mainframe programmer, was running Centresoft importing mainly Atari games from America since 1981, when he realised that there was a wealth of Commodore 64 software over there and every chance that the 64 was going to be the main games machine over here. What was keeping American software out was not its quality but its price.

The Atari 400/800 which Geoff still believes was a "brilliant machine way ahead of its time" never sold well over here because much of the software was only available on disc and usually cost £35 a time. No-one doubted that games like Pole Position and Zaxxon were the best on any micro but people were not prepared to pay high American prices out of low British wages especially when they could buy games for the Spectrum at £5 and £6.

Geoff used his experience of negotiating licensing deals to persuade American houses to let him repackage into cassette format and reprice at around £10 so he could go for the mass market. This was the thinking behind the creation of U.S. Gold in April 1984, then he brought in Ocean to write Spectrum, Amstrad and BBC conversions of the 64 hits.

Companies like Datasoft, Sega, Microprose, Strategic Simulations and Access were all signed up on a first refusal option. Datasoft's strengths were its existing product list including the Atarisoft titles and its ability to sign up films and personalities. Microprose specialised in simulations like F-15 Strike Eagle while Epyx wrote the technically brilliant Impossible Mission which not only won awards but also stayed in the charts for six months. Sega could offer proven hits from its arcade operation such as Spyhunter, and earlier Buck Rogers and Zaxxon.



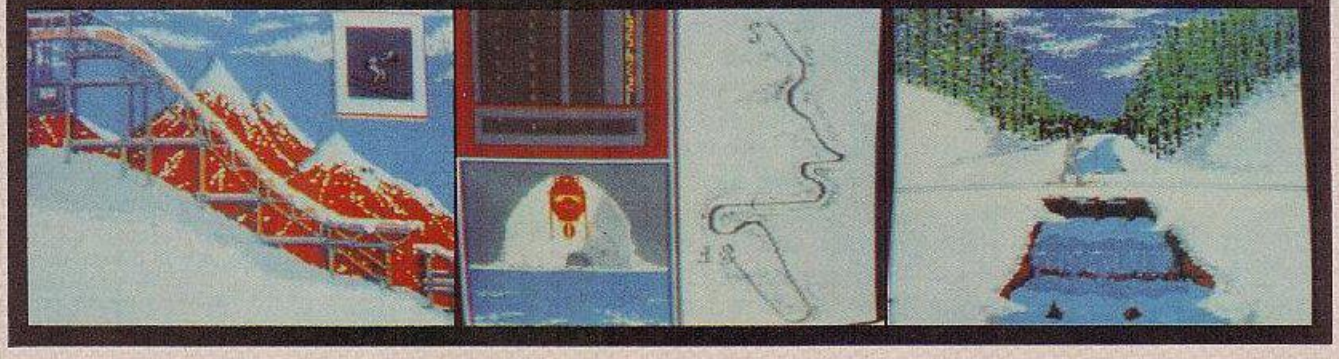
But it was Access that put U.S. Gold on the map with Beachhead and the controversial Raid over Moscow, which ended up being condemned in the House of Commons, not so much for the game itself which was a well written if unimaginative shoot'em-up but for the American originated advertising copy which was so full of cold war cliches that it could have come from the Ronald Reagan Storybook.

At any rate the publicity did no harm to the sales and despite assertions that U.S. Gold is fed up with being portrayed as "the bad guys" Tim Chaney — Geoff's deputy recruited from Commodore early this year reveals in the company's spaghetti western image. "We're like a war machine" he swaggers "we don't have competitors we only have adversaries — we're out to crush them." Nevertheless Geoff and Tim have a high regard for the other top software houses.

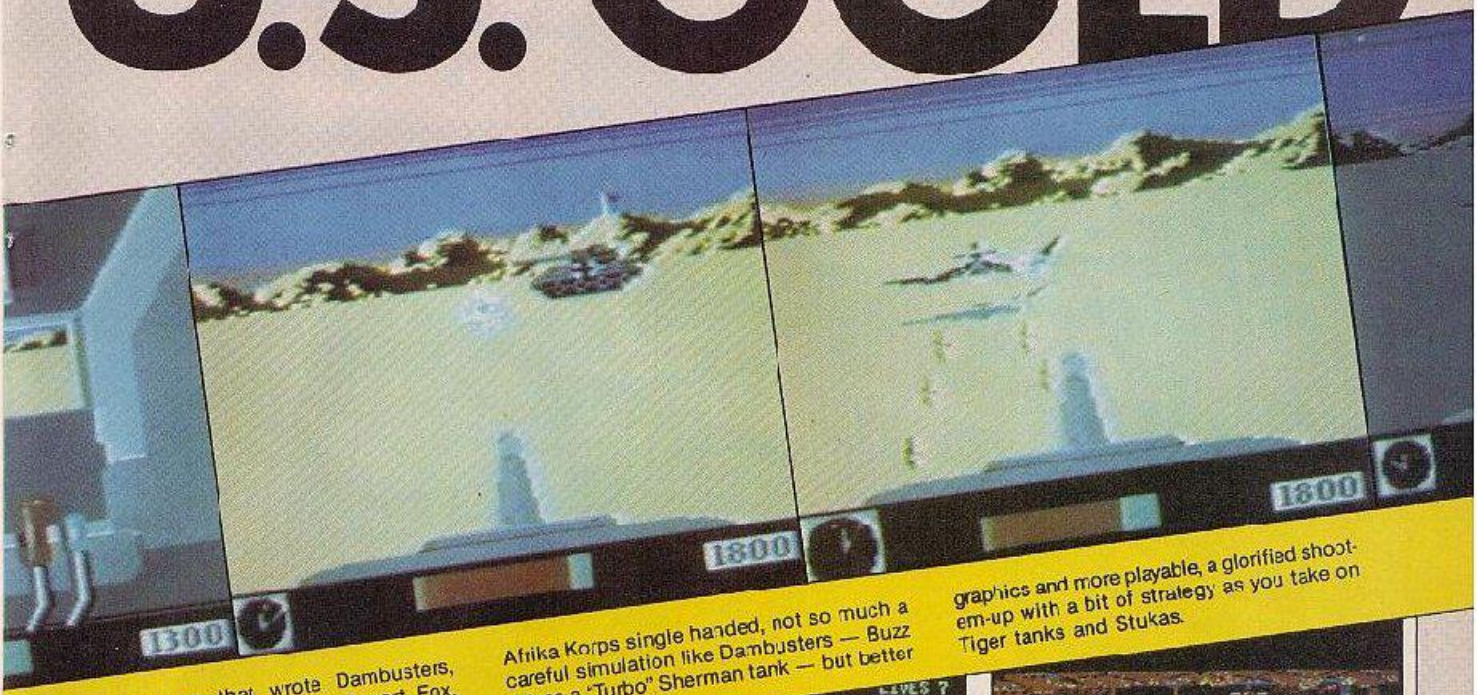
Ocean are almost part of the family as is Gremlin Graphics which Tim calls a "boutique-type company" — literally downstairs from U.S. Gold and controlled by the Browns. But Geoff also admires Beyond and Ultimate, "a

WINTER GAMES

With Summer Games II already on the starting blocks US Gold is counting on Epyx's Winter Games to bring in the bread after Christmas. Summer Games I was eclipsed by Daley Thompson's Decathlon but since then Epyx has made its mark with Impossible Mission. Winter Games again uses a decathlon approach where you have to compete in a series of disciplines such as the ski jump and cross country skiing.



U.S. GOLD



From the team that wrote Dambusters, Sydney Development, comes Desert Fox. This time you are Buzz Baxter taking on the Afrika Korps single handed, not so much a careful simulation like Dambusters — Buzz drives a 'Turbo' Sherman tank — but better graphics and more playable, a glorified shoot-em-up with a bit of strategy as you take on Tiger tanks and Stukas.

fantastic company but they're in a different part of the market — they concentrate on arcade adventures" and keeps an eye on the sleepers — middle-ranking software houses with big corporations behind them — like Robert Maxwell's Mirrorsoft and British Telecom's Firebird.

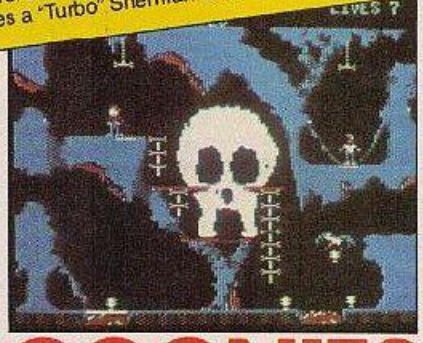
When he is wearing his Centresoft hat Geoff tries out most of the games that he plans to distribute to see if they are up to scratch "although I don't look at a new Ultimate game — I take it". He is remarkably free with his praise for other houses' games — both he and Tim feel that Boulderdash was great — should have been a number one hit, and still relish old favourites like International Soccer and Matchpoint.

Naturally Geoff still hankers after old Atari classics and Tim prefers the Commodore 64. He believes that programmers have stretched the capabilities of the 64 to the limit now "but you can still get new tunes from an old violin".

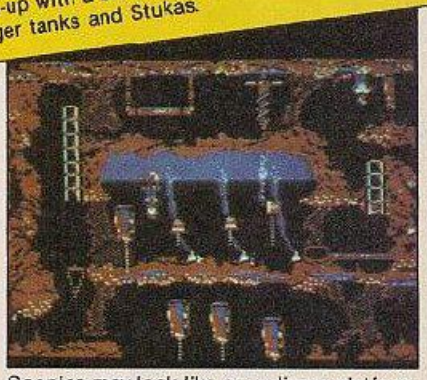
They can appreciate the technical skill involved in a well-written Spectrum game but they don't use the machine for games playing themselves — whereas hits from the States can turn them back into addicts. "We stayed up till two in the morning when Aztec Challenge arrived to try to finish it". When Tim enthuses about Dropzone as being "like going into a china shop and smashing everything" and scans around the room you worry for a moment in case the elegant Scandinavian reading light is about to find out the risks of living on a war machine's desk.

Critics have suggested that U.S. Gold pays

(continued on page 59)



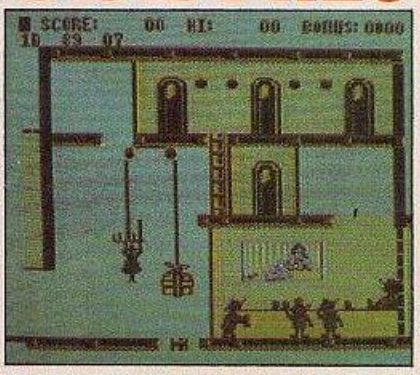
GOONIES



Goonies may look like an ordinary platform game to you but based on Spielberg's latest blockbuster, Geoff Brown hopes it will be this year's Ghostbusters.

ZORRO

Zorro lets you swashbuckle like Douglas Fairbanks Senior. As champion of the common people you swordfight your way across screen after screen of oppressors.



Alternative Reality is a quirky mixed text and graphics adventure with a slightly hippy feel — well it does come from Paradise Programming — as you steer your way through a three-dimensional maze to the Betelguese sales. Philip Price wrote the game with excellent music from Gary Gilbertson.

ALTERNATIVE REALITY

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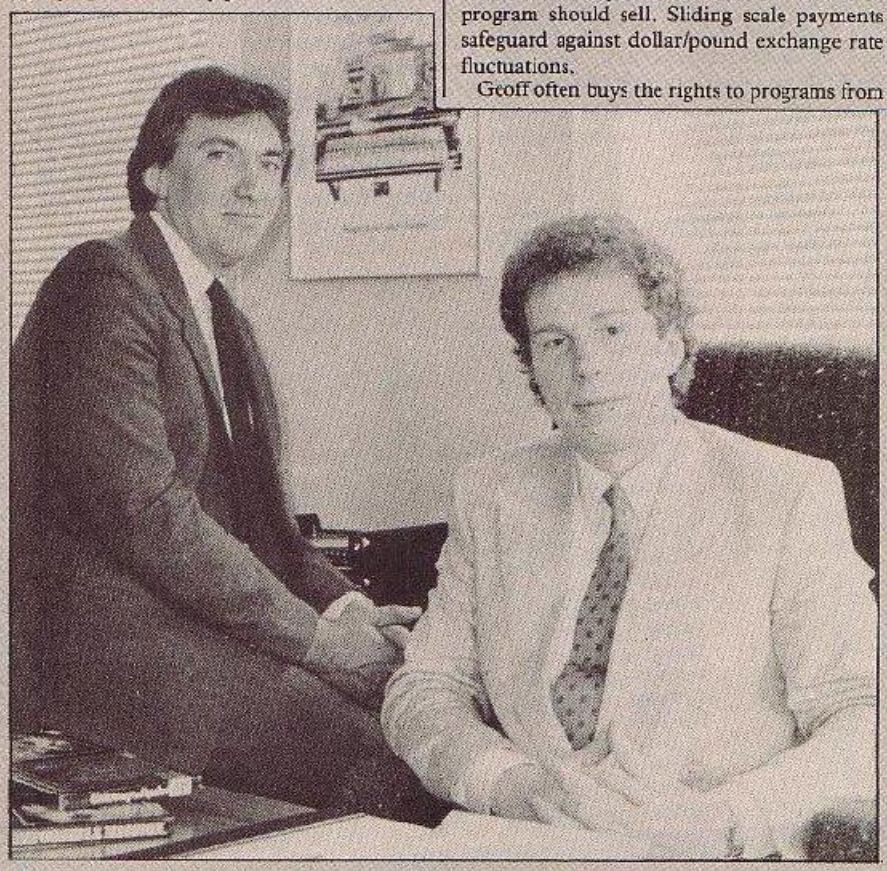
INSIDE U.S. GOLD

BOXING

Geoff and Tim are coming to blows with the boys downstairs at Gremlin. Championship Boxing scores over Gremlin's Rocco and Elite's Frank Bruno on graphics and has training facilities and the option to create your own boxer, but its light hearted approach to the noble art of self defence will not go down well on the Old Kent Road.

(continued from page 57)

the Americans too high a price for the rights to their software but Geoff points out that money up front is only part of the business — otherwise the likes of CBS could have simply bought success with its superior financial resources. Geoff uses a network of talent spotters in the U.S.A. so he can concentrate resources on suitable programs. Given Gold's track record on promoting and selling he can offer a relatively accurate forecast of what a program should sell. Sliding scale payments safeguard against dollar/pound exchange rate fluctuations.

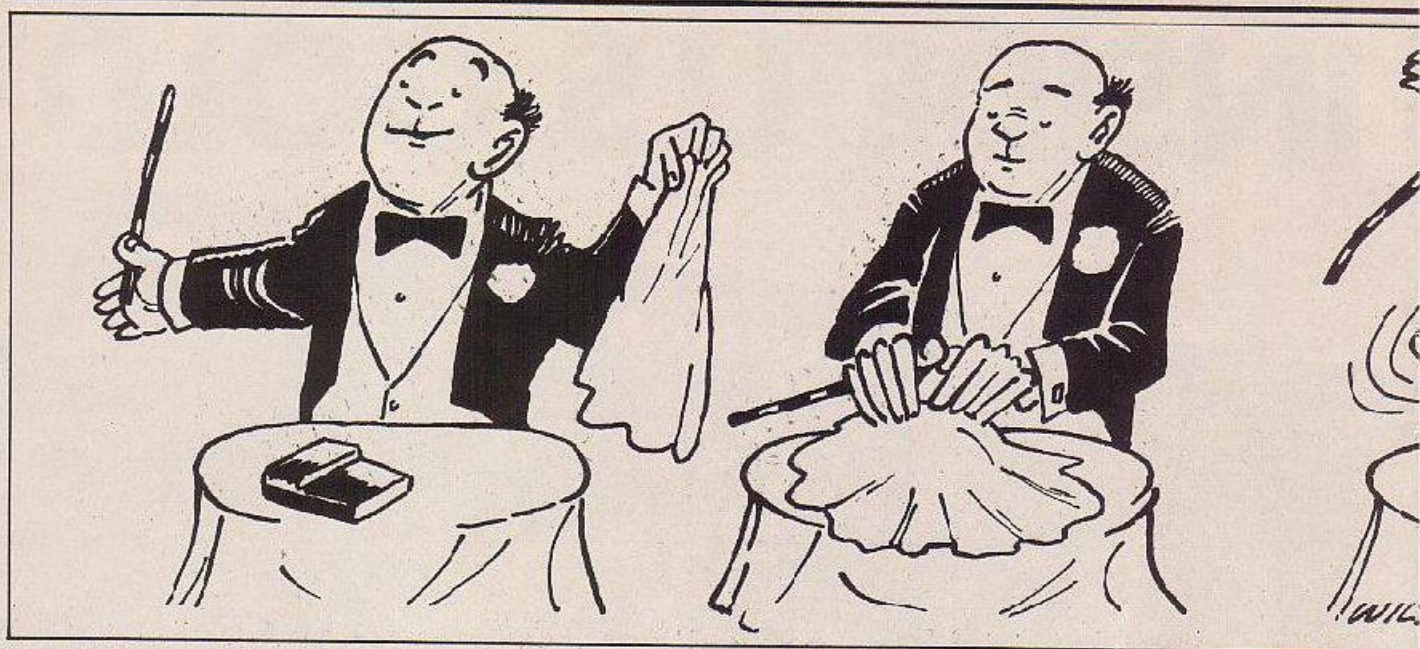


Geoff often buys the rights to programs from houses with a proven record when they are little more than ideas. Sydney Development Corporation, the Canadian — oddly enough — programmers who wrote Dambusters only had to show a game plan for Geoff to sign up Dambusters II. In the meantime, Sydney's Desert Fox is ready for launch.

Geoff's personal preference for shoot-'em-ups has not blinded him to the growing market for simulations, and Microprose run by gung ho Bill Stealey. "I'm selling these games to men. If you haven't got the right stuff I don't want to know" is his trump card. Already F-15 Strike Eagle, Nato Commander, Solo Flight and Kennedy Approach have made their mark. Now Crusade in Europe and Decision in the Desert are on their way under U.S. Gold's new Transatlantic Simulations label, with a hefty £20 price tag.

But sequels and conversions are the name of the game at the moment. After Beachhead II "blood and guts on a computer" comes Pole Position II, and Summer Games II. U.S. Gold should keep its tape duplicators, Ablex in Telford, running flat out over the next few months and there are plans for merchandising deals in other areas "why not Zaxxon soap?" he asks, but Geoff is not complacent. "There is no divine right of U.S. Gold to be successful. There is no masterplan, we were successful by accident with hard work and a few gambles. It's pressure — but it's better than working down a coalmine".

When companies produce a game that flops he believes they should "send them to the crusher" rather than sell them off cheap — and he thinks that if and when U.S. Gold makes a serious error the press will suggest he deserves a similar fate — "look at Clive Sinclair, all that he's done for the industry, the moment he makes a mistake the headlines are 'IDIOT', 'FINISHED'. I get tired of being knocked."



ONE OF the main restrictions of the Sinclair Microdrive system is that it is only possible to access data files from Basic which imposes a severe restriction on database and other similar applications which access data files. For example, changing a record in a data file involves opening a new file, copying the preceding records from the old to the new, writing the altered record to the new file, copying the rest of the old file, deleting the original file and renaming the new file as the old file.

Even this last is not straightforward as Sinclair Basic lacks a Rename command. In practice, the following code illustrates the type of subroutine that would be required to alter the nth record of a file of 100 records called "data" in which each record is 24 bytes long. The new nth record is in the string n$.

```
9000REM Alter a record (Sinclai
r BASIC)
90100PEN#5;"m";1;"data"
90200PEN#6;"m";1;"new.data"
9030IF n=1 THEN GOTO 9070
9040FOR p=1 TO n-1
9050INPUT#5; LINE x$ : PRINT#6;
x$
9060NEXT p
9070INPUT#5; LINE x$ : PRINT#6;
n$ : REM write new record
9080IF n=100 THEN GOTO 9120
9090FOR p=n+1 TO 100
9100INPUT#5; LINE x$ : PRINT#6;
x$
9110NEXT p
9120CLOSE#5 : CLOSE#6
9130ERASE "m";1;"data"
9140MOVE "m";1;"new.data" TO "
m";1;"data"
9150ERASE "m";1;"new.data"
9160RETURN
```

It should be clear that this is both tortuous and very slow as it involves many operations of the microdrive which also causes increased wear and tear on the cartridge and drive. MIRA solves these problems by providing Sinclair Basic with three new commands which together allow the maintenance of random access files similar to those available on micros such as the BBC with disc interface.

The new commands (RND #, Point #, Restore #) are all obtained by using existing Sinclair keywords but in new contexts. The use and syntax of the new commands and the theory behind their implementation are explained below but first, as an example, the above subroutine re-written using the MIRA commands.

Note that a 24 byte record occupies 25 bytes in the file because of the inclusion of a carriage return (CHR$ 13).

```
9000REM Alter a Record (MIRA)
90100PEN#5;"m";1;"data" : RND#5
9020POINT#5,25*(n-1) : PRINT#5;
n$
9030RESTORE#5
9040RETURN
```

The first of the new commands, RND followed by a stream of identifier (e.g.: #5) causes the file attached to the given stream to be declared as a random access file. The file must already have been opened with the standard Open # command and must be a "read" file.

The RND command cannot be used to create or open a file. In the example above, the file "data" would originally need to have been set up with code such as:

```
100DIM x$(24)
110OPEN#5;"m";1;"data"
120FOR p=1 TO 100 : PRINT#5;x$
:NEXT p
130CLOSE#5
```

Point followed by a steam identifier and a numeric expression separated by a comma (e.g. Point #5, n) moves the internal pointer of the file attached to the given stream to the n th byte of the file, where the next Input #, Print #, or Inkey$ # will take place, provided that the file has been opened with Open # and made random with RND #.

An error will be generated if you try to move the pointer outside the limits of the file. The Basic loader program for MIRA — listing 1 — also defines a function, FN p(x), which returns the current value of the internal pointer of the file attached to stream x — e.g. LET pos=FN p(5). For what it's worth, this will work with any "read" file, not just a random access one.

Restore followed by a stream identifier (e.g. #5) closes the random access file attached to the given stream. Restore # must be used in preference to Close # to correctly close a file that

Figure 1. Microdrive channel structure.

Byte	Length	Description
0	2	"output" routine
2	2	"input" routine
4	1	channel specifier "M"
5	2	shadow Rom output
7	2	shadow Rom input
9	2	length of this Chans area (595)
11	2	current buffer position (0-512)
13	1	position of record in file (0-255)
14	10	10 bytes of filename
24	1	bit 0—reset—"read" file set—"write" file bits 1-7—unused (all reset)
25	1	drive number (1-8)
2	2	drive map location
28	12	12 bytes of header pre-amble
40	1	bit 0—set to signal header bits 1-7—unused
41	1	sector number (0-255)
42	2	unused (see text)
44	10	10 bytes of cartridge name
54	1	header checksum
5	12	12 bytes of data pre-amble
67	1	bit 0—reset—not a header bit 1—reset—not end of file set—end of file bit 2—reset—a Print file set—not a Print file bits 3-7 unused (all reset)
68	1	record number (0-255)
69	2	number of bytes in record (0-512)
71	10	10 bytes of filename
81	1	checksum
82	512	buffer data
594	1	data checksum

MIRA

Mike Rains gives your Microdrive a random access facility.

Listing 2.

```
9000 REM **MIRA Initialization**
9010 CLEAR 62999: LOAD *"m";1;"c:m:ra"CODE 63000
9020 CLOSE #0: LET org=63001: LET h=IN' (org/256): LET
l=org-256*h
9030 POKE 23735,l: POKE 23736,h: REM Both must be in o
ne line.
9040 DEF FN a(x)=PEEK 23631+256*PEEK 23632+PEEK (23574
+x*2)+256*PEEK (23575+x*2)-1
9050 DEF FN b(x)=512*PEEK (FN q(x)+13)-256*PEEK (FN q(
x)+12)+PEEK (FN q(x)+1)
9060 CLS : PRINT #0;A" 0,0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0
```

has been marked as random with RND#, but may not be used to close any other type of file.

The theory of adding new commands to Sinclair extended Basic (i.e.: with Interface 1 attached) is fully described by A Pennell, *Master Your ZX Microdrive* (Sunshine 1983) and I Logan, *Spectrum Microdrive Book* (Melbourne House 1983). In short, the shadow system variable Vector (address 23735), which usually contains the address of the Rom error handling routine, must be loaded withe address of the new commands routine which must then perform two distinct functions.

First, it must check the syntax of the new commands and cause an error if it is incorrect, and them, at run-time only, execute the command. "Run-time" means during the running of a program or during the execution of a direct command. Lines 9030-40 of the MIRA Basic loader program alter the value of Vector (lines 9030 first ensures that the shadow system variables have been created).

As well as providing the new commands as described above, MIRA must also provide new routines to replace the standard Print and Input commands. To demonstrate how this is done and to explain the actual operation of the new commands it is necessary to first describe the structure of a Microdrive channel.

Each Microdrive channel takes up 595 bytes in the area of memory reserved for channel information. The start of this area is contained in the system variable Chans (address 23631). The actual location of a particular channel is found by adding the displacement contained in the relevant Streams system variable — two bytes for each of streams −3 to 14 starting at address 23568 — to the value in Chans and subtracting 1. FN c(x) defined in the Basic loader program performs this function for stream x. The byte allocation within a Microdrive channel is shown in figure 1 and should be referred to during the following discussion of the operation of the various MIRA routines.

The RND# command run-time routine performs three actions:

- Bit 0 of byte 24 in the relevant channel is set to signify a "write" file.
- The addresses of the new output and input routines are loaded into bytes 5-6 and 7-8 of the channel.
- Bit 0 of the unused 42nd byte of the channel is used as a flag to signal whether the buffer contents have been altered. RND# resets this bit to signify "unaltered".

The following actions are performed by the Point# command:

- The record number in which the desired file position lies is calculated and compared with the value in byte 13 of the channel.
- If they do not match, the "write buffer" and "read buffer" sub-routines are called to fetch the required record into the buffer.
- The desired position within the record is loaded into channel locations 11 and 12.

The Restore# calls the "write buffer" sub-routine to write the current record if it is flagged as "altered" (i.e.: bit 0 of byte 42 set), resets bit 0 of channel byte 24 to flag the file as "read" and then calls the shadow Rom Close# routine.

The new output routine used by all Print# statements is entered with the character to be written to the file in the A register. The following actions are performed:

- The current buffer position is obtained from bytes 11 and 12 of the channel, added to 82 — the start of the data area — to give the correct address, and the character from the A register stored there.
- The buffer position is incremented and re-stored in bytes 11 and 12.
- The record is flagged as "altered" by setting bit 0 of byte 42.
- The "next record" sub-routine is called if the end of the present record has been reached.

The new input routine used by Input# and Inkey$# statements performs the following actions:

- Tests for the end of the current record and calls "next record" if required.
- Increments the buffer position in bytes 11 and 12 of the channel.
- Using this position — added to 82 as before — reads a character from the buffer into the A register and sets the carry flag to signal a successful read.

MIRA can be entered into your Spectrum in the following way:

- The Basic loader program — listing 1 — will Poke the machine code from the Data statements into memory and then initialise MIRA.

Once the MIRA code has been entered it may be saved to Microdrive with the command

SAVE *"m";1;"c:mira" CODE 63000,410

Listing 2 may then be used to load the code and initialise MIRA. If you have relocated the code you will need to change the Clear address in line 9010 and the value of "org" in line 9020. Note that MIRA will need to be re-activated by the use of lines 9020-60 of listing 2 following a New command. ■

Listing 1.

```
1 REM ************************
2 REM **MIRA (BASIC LOADER)**
3 REM **(c) Mike Rains 1985**
4 REM ************************
5
6 CLS : PRINT "                    STOP  TAPE"'''
MIRA (1.0)'''Please note that although it is supplie
d on cassette, this      program will only operate wit
h  Interface 1 attached and is      entirely concerned
with micro-drive operations"'''  Press any key to c
ontinue": PAUSE 0

8:
10 DATA 254,062,215,024,000,254,165,040,011,254,227
11 DATA 1283,040,049,254,169,040,050,175,240,001,215
12 DATA 1061,032,000,254,255,032,246,215,032,000,215
13 DATA 1640,150,028,205,103,005,205,222,246,221,205
14 DATA 0791,024,070,040,003,195,002,009,221,203,024
15 DATA 1165,198,033,001,247,221,117,007,221,116,006
16 DATA 1231,033,040,247,221,117,005,221,116,006
17 DATA 1275,205,042,134,195,193,005,024,044,195,240
18 DATA 1062,001,215,032,000,254,033,032,246,215,032
19 DATA 1439,000,215,130,028,205,103,005,205,222,246
20 DATA 1814,217,229,217,205,117,247,221,203,024,134
21 DATA 1639,205,164,018,217,225,217,195,193,005,195
22 DATA 1279,240,001,215,032,000,254,035,032,246,215
23 DATA 0976,032,000,215,130,000,254,044,040,002,231
24 DATA 1013,000,215,032,000,215,130,028,205,103,005
25 DATA 1067,215,162,045,197,205,222,246,225,167,203
26 DATA 0619,060,075,038,000,040,001,036,221,126,213
27 DATA 1609,185,040,013,217,229,217,229,197,205,117
28 DATA 1815,247,225,205,154,247,225,221,117,011,221
29 DATA 1543,116,012,217,225,217,195,193,005,215,140
30 DATA 0500,050,125,079,024,000,033,022,092,009,094
31 DATA 1609,035,086,213,225,229,237,184,221,225,032
32 DATA 1040,003,195,009,006,237,091,075,092,221,025
33 DATA 1691,221,043,201,225,033,254,255,221,025,221
34 DATA 1541,094,011,221,086,012,221,229,221,025,221
35 DATA 1348,119,002,221,225,019,221,115,011,221,114
36 DATA 1453,012,221,203,042,148,203,074,200,202,095
37 DATA 1489,247,201,221,094,0 ,221,086,012,221,110
38 DATA 1177,189,012,221,094,0 ,221,086,012,221,110
39 DATA 1114,069,221,102,070,055,237,002,048,009,221
40 DATA 1716,229,205,095,247,221,225,024,230,019,221
41 DATA 1194,115,011,221,114,012,227,221,229,221,025
42 DATA 1794,221,124,007,221,225,055,201,217,229,217
43 DATA 1495,205,111,247,035,205,154,247,002,000,221
44 DATA 1303,119,011,221,119,012,217,225,217,201,058
45 DATA 1149,000,221,118,013,229,221,203,042,070,040
46 DATA 1468,025,221,126,025,205,247,023,251,221,126
47 DATA 1065,041,221,118,013,205,145,026,251,062,000
48 DATA 1708,225,247,023,251,225,201,221,117,013,205
49 DATA 1389,023,026,251,062,000,205,247,023,251,221
50 DATA 0580,203,042,134,201,000,000,000,000,000,000
60 DATA 54858

100 CLEAR 62999: LET ef=0: RESTORE 10: POKE 23692,255
110 LET t=0: FOR p=0 TO 40: READ ch: LET t=t+ch: NEXT p
0 TO 9
120 READ a: LET t=t+a: POKE 63000+10*p+q,a: NEXT q
130 LET tt=t+ch: IF t<>ch THEN BEEP .2,50: PRINT "E
rror in line ";p+10;" ";
140 PRINT p+10;" ";
150 NEXT p: READ st: IF st<>tt THEN BEEP .2,50: PRINT
"Error in checksum": LET ef=1
160 IF ef THEN BEEP .2,50: PRINT "Correct errors and
re-run": STOP
170 PRINT ""All data OK - Initializing MIRA": PAUSE
100

1000:
9000 REM *MIRA INITIALIZATION*
9030 CLOSE #0: LET org=63001: LET h=INT (org/256): LET
l=org-256*h
9040 POKE 23735,l: POKE 23736,h: REM Both must be in o
ne line
9050 DEF FN a(x)=PEEK 23631+256*PEEK 23632+PEEK (23574
+x*2)+256*PEEK (23575+x*2)-1
9060 DEF FN b(x)=512*PEEK (FN q(x)+13)-256*PEEK (FN q(x)+
1)+256*PEEK (FN q(x)+12)
9070 PRINT ""Save Machine Code to Microdrive?Yes/No "
: PAUSE 0: LET a$=INKEY$: IF a$="y" OR a$="Y" THEN PR
INT "YES": SAVE *"m";1;"c:mira"CODE 63000,410: PRINT
"Machine Code saved": PAUSE 100
9080 CLS : PRINT #0;A" 0,0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0
```

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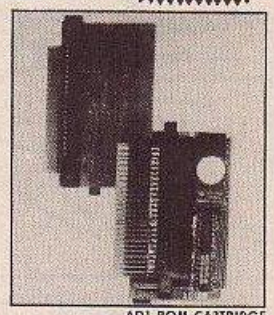

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makes Expert Systems accessible to you in a way which has never been done before. With machine-specific listings for SPECTRUM+ and SPECTRUM, AMSTRAD, BBC MICRO, COMMODORE 64, and all MSX machines, plus any machine furnished with Microsoft BASIC, Tim's new book opens up the world of Expert Systems in a direct, practical way.

The book discusses, in some detail, the most successful Expert Systems developed to date (including PROSPECTOR, MYCIN and DENDRAL) and shows how the field has developed over the past decade. Ready-to-run Expert Systems programs in the book include AUTO MECHANIC and MEDICI (to give yourself a quick 'stress check'). The major Expert System in the book delights in the name of FUZZY RITA. This program uses fuzzy logic within the framework of an Expert System shell to produce a genuinely useful expert on just about any subject you choose, from chicken sexing through to medical diagnosis and weather forecasting. You'll also be given the chance to explore the languages which dominate the Artificial Intelligence and Expert Systems worlds. The book contains BASIC emulators of PROLOG and LISP so you can get them up and running on your computer, without having to actually buy the languages.

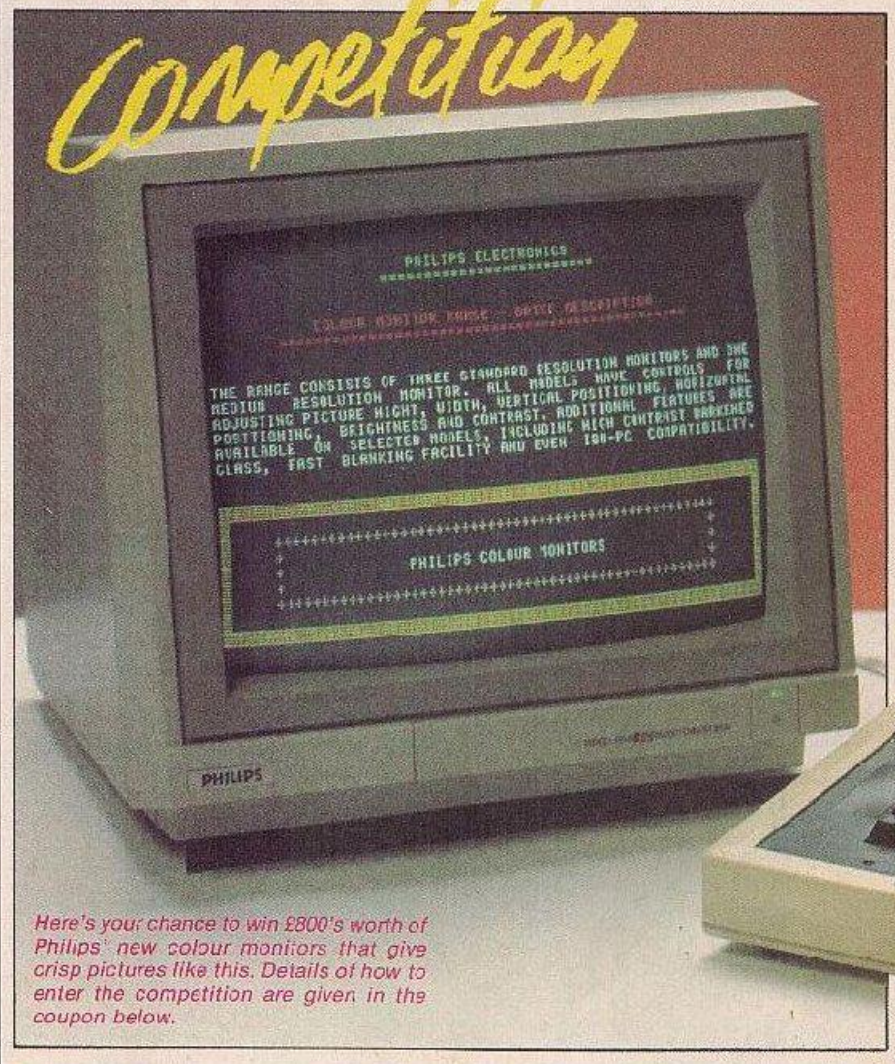
Exploring Expert Systems on your Microcomputer, by Tim Hartnell (ISBN 0 907563 74 0), is £7.95, and is available from most book and computer stores, or you can get it direct by mail, post free, from the publishers:

Interface Publications Ltd., Dept YC,
9-11 Kensington High Street,
London W8 5NP
(Trade only: WHSD Leicester)

Interface

PHILIPS MONITOR

How bright is your computer? Not as bright as it could be with the new range of Philips colour monitors. We're giving away a £300 Philips CM-8533 as first prize, and the runners-up will receive a CM-8524 and CM-8501, together with £500. The new 8500 series is designed exclusively for use with all leading makes of home and personal computers. All four models have 14in. screens — three are standard resolution models whilst the top of the range is a medium resolution monitor for 80-character text and colour graphic use. A choice of composite video and RGB inputs and adjustable stands make life much easier.



Here's your chance to win £800's worth of Philips' new colour monitors that give crisp pictures like this. Details of how to enter the competition are given in the coupon below.

COMPETITION RULES

- The winner of the competition will be the person who, in the view of the editor, puts the monitor features in the right order and comes up with the most convincing or amusing reason for wanting a Philips' monitor.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

PHILIPS COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your entry to Philips Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Study the list below and mark in order of priority the key features of the new Philips colour monitors.

- Dedicated for computer use ☐
- Outstanding text and graphic displays ☐
- Adjustable stands ☐
- Low-reflection treated glass ☐
- Choice of composite video and RGB inputs ☐
- Compatibility with leading computers ☐

I would like a dedicated Philips monitor because _____

_____

_____

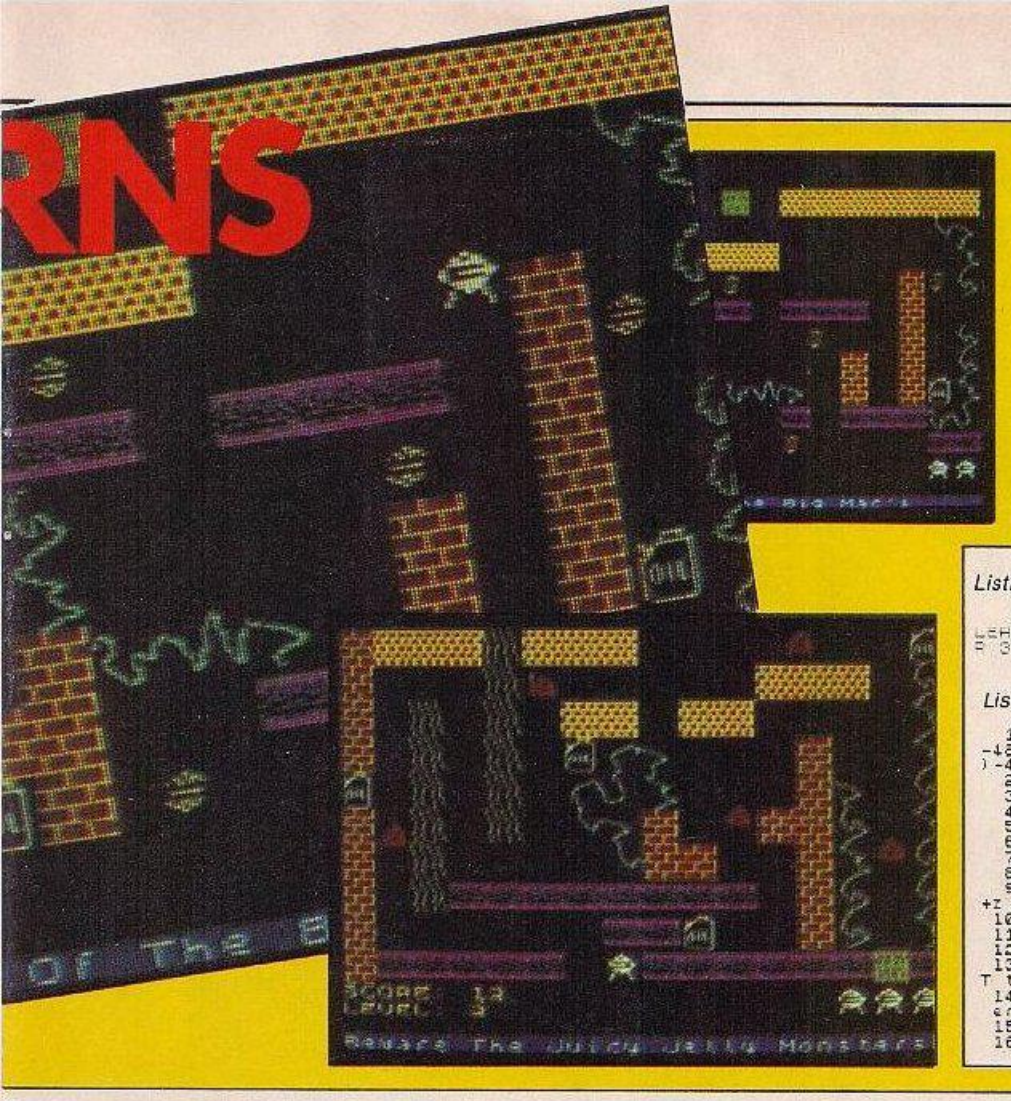
Name _____

Address _____

_____

Listing 3.

```
34800  00000000000000000  =  0
34809  00000000000000000  =  0
34818  00000000000000000  =  0
34827  00000000000000000  =  0
34836  00000100F103310    =  105
34845  0F07F0010100000    =  71
34854  00001000F001F108   =  128
34863  FF0F0100F010000    =  610
34872  00000107F103110    =  117
34881  0F0F0F01010000     =  70
34890  00000F0F0F00F001   =  840
34899  F0F0F0100F010000   =  910
34908  00000107F103110    =  117
34917  0F0F0F01010000     =  70
34926  00000F0F0F00F001   =  840
34935  F0F0F0100F010000   =  910
34944  00000107F103110    =  117
34953  0F0F0F01010000     =  70
34962  00000F0F0F00F001   =  840
34971  F0F0F0100F010000   =  910
```



This program is available on Telsoft.

Listing 1.

```
  1 BORDER 0: PAPER 0: INK 0: 
LEAR 32000: LOAD ""CODE : RUN US
R 39150
```

Listing 2.

```
  10 DEF FN h(h$): =16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+(CODE h$(2
)-48-(7 AND h$(2)>"9"))
  20 INPUT "Start: ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ": INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

```
39328  00062505050605050  =  42
39312  05000000000000000  =  21
39344  00000000000000210  =  30
39376  05000303000000306  =  37
39360  05000000000000005  =  17
39392  05000000000000000  =  21
39376  00000000000000000  =  20
39408  05120011111111111  =  109
39392  00111111000000000  =  59
39440  05000000000000000  =  17
39408  00000000000000001  =  20
39424  05000000000000000  =  31
39456  00000000000000000  =  20
39472  05000000000000000  =  22
39440  00100000000000205  =  71
39456  05000000000000000  =  27
39488  00110011111111900  =  90
39472  05000000000000000  =  31
39504  00000000000000111  =  56
39488  05000000000000000  =  24
39520  10500E1F000001     =  147
39504  10500F2000000000   =  203
39536  FF3018401F000001   =  107
39520  10500F2000000000   =  203
39552  00000000000000000  =  0
39584  00000000000000000  =  0
39616  00000000000000000  =  0
39648  1295778278652051   =  711
39680  9005204F7550F177   =  777
39712  204F5E0C7920400     =  550
39744  5F5E7374557273200   =  514
39776  0000000000000000   =  0
39808  0000000000000000   =  0
39840  0000000000000000   =  0
39872  0000000000000012   =  18
39904  0000000000000000   =  0
39936  0000000000000000   =  0
39968  0000000000000000   =  0
40000  0000000000000000   =  0
40032  0000000000000000   =  0
40064  0000000000000000   =  0
40096  0000000000000000   =  0
40128  0000000000000000   =  0
40160  0000000000000000   =  0
40192  0000000000000000   =  0
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40256  0000000000000000   =  0
40288  0000000000000000   =  0
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40352  0000000000000000   =  0
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40448  0000000000000000   =  0
40480  0000000000000000   =  0
40512  0000000000000000   =  0
40544  0000000000000000   =  0
40576  0000000000000000   =  0
40608  0000000000000000   =  0
40640  0000000000000000   =  0
40672  0000000000000000   =  0
40704  0000000000000000   =  0
40736  0000000000000000   =  0
40768  0000000000000000   =  0
40800  1555E765.73695F65  =  603
40832  204F652C51E55520   =  566
40864  3E5D5E7.55E70D61   =  640
40896  20E4E5E4E577320    =  565
40928  0500000000000012   =  28
```

```
40960  0807000000000000   =  15
40992  0500000000000000   =  46
41024  0809040905052500   =  54
41056  0000000000000000   =  10
41088  0000000000000000   =  8
41120  0500000000000100   =  71
41152  0500000005052500   =  26
41184  1200000500000000   =  23
41216  0501000000052000   =  44
41248  0500001111110008   =  84
41280  0500000000000000   =  40
41312  0500000000000000   =  13
41344  0500E1000051200    =  78
41376  0500001111000808   =  88
41408  0500000000000000   =  80
41440  0500000000000000   =  80
41472  0500000000000000   =  80
41504  0000000000000000   =  0
41536  0000000000000000   =  0
41568  0000000000000000   =  0
41600  0000000000000000   =  0
41632  0000000000000000   =  0
41664  0000000000000000   =  0
41696  0000000000000000   =  0
41728  0000000000000000   =  0
41760  0000000000000000   =  0
41792  0000000000000000   =  0
```

(continued from previous page)

```
37848  6B6B2050E9742020  = 805
37856  2020202020202020  = 256
37864  1000000000000000  = 18
37872  0000000000F0F003  = 97
37880  0000000000000808  = 23
37888  0500000005120000  = 97
37896  C8000000000000312  = 37
37904  C0007111111111100  = 98
37912  1111111111001111  = 119
37920  0000000000000000  = 0
37928  0000000000000000  = 0
37936  0000000000000000  = 0
37944  0000050005052500  = 20
37952  0500300000000000  = 24
37960  0005050005053000  = 28
37968  300F090AC9100000  = 107
37976  200C05000505000  = 28
37984  0300000000E8900  = 45
37992  0500512005000000  = 38
38000  0000000000000000  = 0
38008  0012050512000000  = 48
38016  001F05801F60FF02  = 547
38024  30707F2800FE30A0  = 769
38032  8F5001003010AF40  = 1495
38040  00FF30909F200100  = 839
38048  28903F2001000000  = 416
38056  0000000000000000  = 0
38064  0000000000000000  = 0
38072  0000000000000000  = 0
38080  5A8865224689EC8A  = 717
38088  0572005E1E98E72  = 755
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38104  2052616D7261E765  = 733
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38128  0000000000000000  = 0
38136  0000000000000000  = 0
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38184  0000000000000007  = 7
38192  0000000000000000  = 0
38200  0000000000000007  = 7
38208  0000000000001200  = 18
38216  0000000012000000  = 18
38224  0505060505050505  = 16
38232  0505050505050505  = 16
38240  0000000000000300  = 3
38248  0000000000000000  = 0
38256  0000000000000000  = 0
38264  0000000000000000  = 0
38272  0057051F4F300001  = 261
38280  38484F8250001  = 4360
38288  4F2000123A84F2A  = 4865
38296  000138B4F250001  = 3840
38304  38B4F2500013600  = 4361
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38320  0000000000000000  = 0
38328  0000000000000000  = 0
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38344  0000054005205075  = 6652
38352  6C7361749EE5720  = 7988
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38384  0000000000000000  = 0
38392  0000000000000000  = 0
38400  0000000000000000  = 0
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38560  34938F2021302400  = 1365
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38608  2048517272695572  = 1343
38616  2020202020202020  = 1343
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38632  0707060100000002  = 41
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38648  0000000B0000000  = 11
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38720  0000000000000000  = 11
38728  0000000000000000  = 11
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38760  0000000000000000  = 11
38768  0000000000000000  = 11
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38808  010020404F7001003  = 513
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38864  7285020000000504  = 1050
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38896  0707424242420505  = 240
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38920  0303030307070707  = 40
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39040  3E043A0017043300  = 1373
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39056  C4033500110050C3  = 1449
39064  C7046500C4033300  = 1337
39072  1105520014033500  = 549
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39088  1105520014033500  = 450
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39224  1300110016150010  = 1
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39256  4A6566666572792E  = 1551
39264  1007FFDD2416C08D  = 1013
39272  6E00CD23CD5600CD  = 1510
39280  20CDBE00CD23CD5E  = 1513
39288  00CD237C6528E1DD  = 1050
39296  E5CD5803CDE101FE  = 1
39304  BFCD7C0B-72804UB  = 1031
39312  1F0B5F20D2CB6728  = 1
39320  0EAF329C9F0229BF  = 1
39328  028F9F3B03C23B9F  = 1058
39336  CD6B9F3E8F4F060F  = 848
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39576  CD131AD61F5FE5E0  = 1
39584  2B0318000D632807  = 1
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39600  7EFFED7B6E1F57F5  = 1475
39608  3A5701FE7FED73E6  = 1066
39616  1F5FF815F2C3B4B20  = 1
39624  04FE1F8B003A9F9F  = 1
39632  0D9FFF5B2B033356  = 1
39640  9F7CF61F577DF60A  = 1234
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39672  BD7B57041EDFED73  = 1
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39688  1F2300C3A979F3C30  = 1
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39752  9C78D60F47CD5A9C  = 1
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39768  C60F47CD5A9C78FE  = 1
39776  512807FE1D280332  = 1
39784  959F3H59FE73A94  = 1
39792  9F024FC3A959F47CD  = 1
39800  D39C79C60F4FCDD9  = 1
39808  9C78C60F47CDD99  = 1
39816  79D62F4FCDD99C79  = 1
39824  FEF1300032949F33  = 1
39832  949F4F3A959F4733  = 1
39840  939F3CCD9C9EDD21  = 1
39848  989F3E0632989FDD  = 1
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39888  BE0E0237CED44DD  = 1
39896  7701DE44DD7700  = 1
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39920  D60CDDBE03301906  = 1
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39944  CF180DBE04D2CD95  = 1
39952  210800DD193A989F  = 540
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39968  0292A9FF8C8C8F32  = 907
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40024  3B9A8D0546E0CB3D  = 800
40032  CB3DCB3DCB3D3EAF  = 1329
40040  90E6F05F19110000  = 791
40048  197FF00C3CE5C6  = 1145
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40096  E6FC4FAFC1909EED  = 1480
40104  4B9C9F0D303ED4D  = 891
40112  90FCDBB9F161487  = 802
40120  FFC01E7A81C0311  = 1
40128  0800CDB5032120D7  = 845
40136  110A0CCB5031114  = 469
40144  0511140CDB503C1  = 624
40152  C9360054E0CB3DCB  = 895
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40168  E5F05F19110000  = 502
40176  7FFE0C0FFE5C0FE  = 1074
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40192  9303C0FF79A0D97  = 977
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40208  9F3A3F9F3C328F9F  = 901
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40224  90DD3E00DD23DD63  = 1242
40232  00DD23DD23E00DD23  = 827
40240  DD5800DD217C8528  = 903
40248  09DDE5CD5503DDE1  = 1294
40256  18DFCD689FCD689F  = 1265
40264  10051100130116  = 85
40272  0010065A4F555645  = 430
40280  204550434150454  = 535
40288  20544A3224D4144  = 499
40296  204341554524E53  = 560
40304  C8ODDD22E0774154  = 572
40312  4348204F55544048  = 621
40320  4F52204F54484552  = 579
40328  204744D4D532042  = 499
40336  590D0010052020  = 232
40344  2020202020204E41  = 331
40352  5A4C204A4A5A4645  = 542
40360  5E592E100316150  = 279
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40376  F0A6B0CF0018100F  = 1048
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40424  1105CDCB503ED4B  = 723
40432  949F5E14CD9C9EC1  = 1101
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40464  0050434F5415GA16  = 160
40472  1527FFEC4B909FCD  = 1103
40480  1B1ACDBE9E110210  = 638
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40496  2020202020202020  = 256
40504  2020202020202020  = 256
40512  2020202020202020  = 256
40520  2020202020202020  = 256
40528  2020202020202047  = 295
40536  414D4820AF554552  = 559
40544  2020202020202020  = 256
40552  2020202020202020  = 256
40560  2020202020202020  = 256
40568  2020202020202020  = 256
40576  2020202020202020  = 256
40584  2020202CFF410007  = 831
40592  06FF10FE3B7CB520  = 911
40600  F7C3EB9E5000FE5  = 1210
40608  110297187FE12429  = 320
40616  E9929911008115F  = 598
40624  CDC79E79C6084FCD  = 1170
40632  D79FC9F17EFFFD9  = 1455
40640  04F7231F7233E9C5  = 990
40648  D5C5C409F78D508  = 1180
40656  47CD409F78D50747  = 911
40664  CD409F79C8074FCD  = 1008
40672  409F7CC0074CD40  = 882
40680  2F78C6034-7C1409F  = 984
40688  113E123B67F561E  = 599
40696  D0C5E53EAF934797  = 1045
40704  1F371FA7FF8AFF8  = 841
40712  A867790707A8F8  = 811
40720  C7A0070F79E6D7  = 850
40728  47AFB0EFF280CDE  = 784
40736  3FCBFFC819C8ACB  = 1210
4274  1B10F47B277B079  = 1045
40752  A5B377E1C1B0059A  = 960
40760  679F3D80E6D1C109  = 1140
40768  C8E5D5C8C8CB3CB  = 1360
40776  3835159026006F9  = 473
40784  2A9A9C9C8C9C9C9  = 584
40792  CB391620591191100  = 413
40800  5819D173E12CC900  = 1055
40808  210040011001B3600  = 1799
40816  5B0B7B8120F8E2E  = 857
40824  CD011EC9C5A03E58  = 743
40832  2A6E9CBE2002362  = 524
40840  2310F3C9000000000  = 500
40848  0000000000000000  = 0
40856  0000000000000000  = 0
40864  0000000000000000  = 0
40872  0000000000000000  = 0
40880  0000000000000000  = 0
40888  0000000000000000  = 0
40896  0000000000000000  = 0
40904  0000000000000000  = 0
40912  0000000000000000  = 0
40920  0000000000000000  = 0
40928  0000000000000000  = 0
40936  0000000000000000  = 0
40944  004259204B415E4C  = 485
40952  204F4E4B4645259  = 565
40960  2E0000000000000  = 16
40968  0000000000000000  = 0
40976  0000000000000000  = 0
40984  0000000000000000  = 0
40992  0000000000000000  = 0
41000  0000000000000000  = 0
41008  0000000000000000  = 0
41016  0000000000000000  = 0
41024  0000000000000000  = 0
41032  0000000000000000  = 0
```

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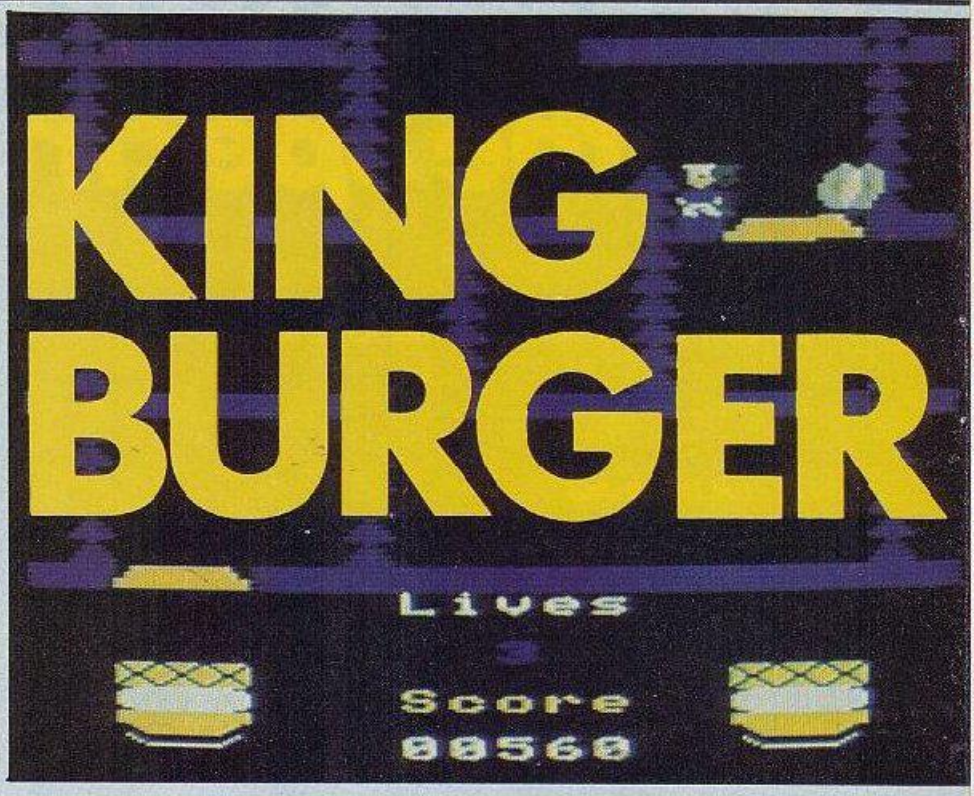
Listing 1.

```
[illegible]
```



IN KING BURGER YOU must move around the screen stepping on pieces of hamburger to make them fall to the bottom to become completed burgers. However, there is a fried egg called Freda trying to stop you.

The burgers are made in four sections each of which must be walked across causing it to fall down a level and knock down anything which is below it until it reaches the tray at the bottom. There are six levels, each of which gets progressively harder until, on the sixth sheet,

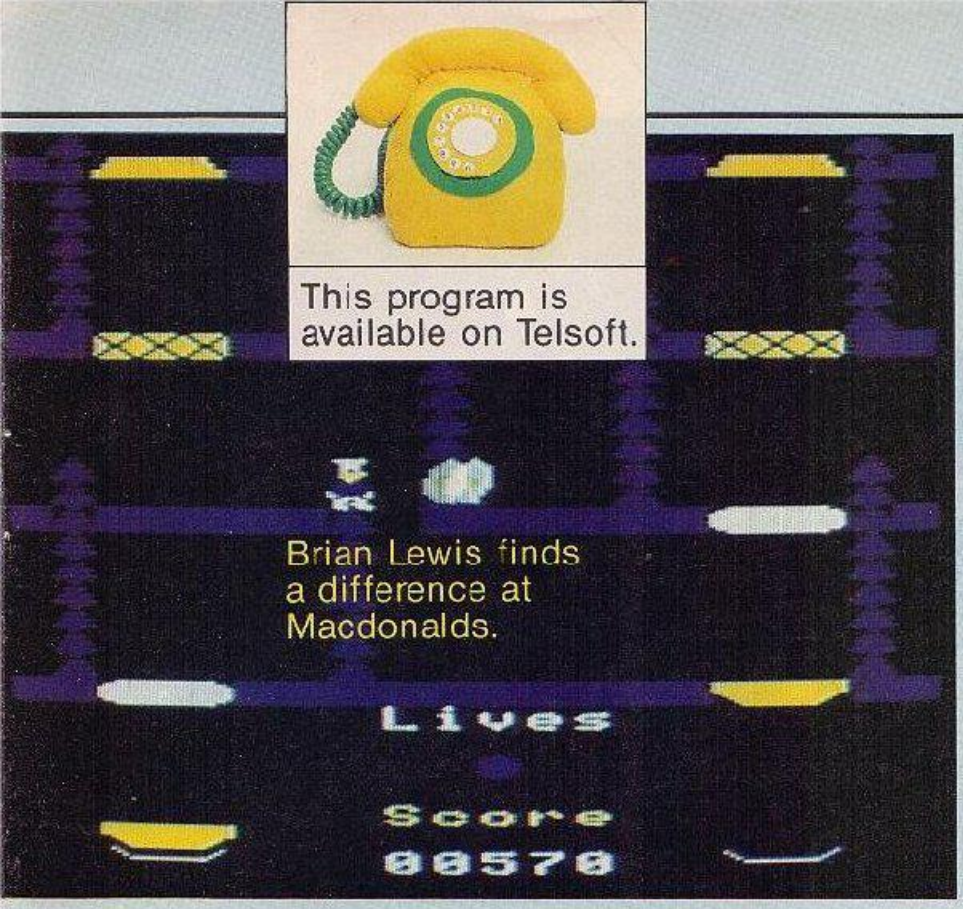
Listing 2.

```
   10DATA0,17,51,119,119,118,252,252,204,238,255,255,2
55,247,243,243
   20DATA254,255,255,119,119,51,2,6,247,238,238,204,20
4,204,6,0
   30F%=&5000
   40FORT=0TO31:READD:?T?F%=D:NEXT
   50TEMP=F%+128:U%=TEMP+64:FORT=0TO2STEP2:P%=U%:[OPT
   60LDA#&40:STA&D70:LDA#&5A:STA&D71:LDA#32:STA&D72:LD
A#21:STA&D73:LDA#1:STA&D74
   70LDA#TEMP MOD256:STA&D76:LDA#TEMP DIV256:STA&D77
   80LDA#0:STA&D75:LDY#0:TYA:.YS STA(TEMP),Y:INY:CPY#64:
BNEYS
   90LDA#64:STA&D78:LDA#89:STA&D79:LDA#2:STA&D7A:LDA#2
1:STA&D7B:LDA#0:STA&D7C:LDA#0:STA&D7D
  100LDA#(TEMP+32) MOD256:STA&D7E:LDA#(TEMP+32) DIV256
:STA&D7F:RTS
  110.rout JSRrub
  120LDA&A5:CMP#&FF:BEQN
  130LDA&A3:CMP#&76:BNEnosam
  140LDA&A2:CMP#&D2:BMInoleft:JSRleft:JMPNORU:.noleft
JSRright:.NORU JMPN
  150.nosam
  160LDA&A4:CMP#1:BNEno:JSRleft:JMPN:.no JSRright:.N
  170JSRSEE:LDA&A5:CMP#&FF:BNENOLAD:JSRLADDR:.NOLAD
  180JSRDIS:JSRSAME:CPX#&FF:BEQySA:JSRBURG:CPX#&FF:BNE
ySA:JSRrub:JSRU%:JMPDIS:.ySA
  190.DIS CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&4
E:LDY#0:.A LDAF%,Y:STA(&A0),Y:INY:CPY#16:BNEA:.B LDAF%
,Y:STA(&4D),Y:INY:CPY#32:ENEB:RTS
  200.check LDA&A4:CMP#0:BEQau:LDA&A2:CMP#0:BEQhit:JMP
AU:.au LDA&A2:CMP#38:BEQhit:.AU LDX#0:LDY#0:.C LDA(&4D
),Y:BEQhit:RTS:.hit LDX#&FF:RTS
  210.BURG LDX#2:SEC:LDA&A0:SBC#&40:STA&4D:LDA&A1:SBC#
1:STA&4E:LDY#0:.Bur LDA(&4D),Y:AND#240:BNEhit:INY:CPY#
16:BNEBur:RTS
  220.CHECK LDX#0:LDY#8:.AaA LDA(&4D),Y:CMPF%,Y:BEQhit
:INY:CPY#16:BNEAaA:RTS
  230.left LDA#1:STA&A4:CLC:LDA&A0:ADC#&78:STA&4D:LDA&
A1:ADC#2:STA&4E:JSRcheck:CPX#&FF:BEQright:SEC:LDA&A0:S
BC#16:STA&4D:LDA&A1:SBC#0:STA&4E:JSRCHECK:CPX#&FF:BEQE
END:SEC:LDA&A0:SBC#8:STA&A0:LDA&A1:SBC#0:STA&A1:DEC&A2
:JMPread
  240.EEND LDA#1:STA&A4:RTS
  250.right LDA#0:STA&A4:CLC:LDA&A0:ADC#&90:STA&4D:LDA
&A1:ADC#2:STA&4E:JSRcheck:CPX#&FF:BEQleft:CLC:LDA&A0:A
DC#16:STA&4D:LDA&A1:ADC#0:STA&4E:JSRCHECK:CPX#&FF:BEQl
eft:CLC:LDA&A0:ADC#8:STA&A0:LDA&A1:ADC#0:STA&A1:INC&A2
:JMPread
```

Listing 3.

```
   10VDU23,130,31,31,63,63,255,255,255,0,23,131,255,25
5,255,255,255,255,255,0
   20VDU23,132,248,248,252,252,255,255,255,0,23,133,12
6,189,219,231,231,219,189,126
   30VDU23,134,31,127,255,255,255,255,127,31,23,135,25
5,255,255,255,255,255,255,255,23,136,248,254,255,255,2
55,255,254,248
   40VDU23,137,255,255,255,255,63,31,15,7,23,138,255,2
55,255,255,252,248,240,224
   50VDU23,139,32,16,8,7,0,0,0,0,23,140,0,0,0,255,0,0,
0,0,23,141,4,8,16,224,0,0,0,0
   60ENVELOPE1,1,2,10,2,5,2,10,126,0,0,-126,126,126
   70ENVELOPE2,1,10,-30,10,20,4,4,126,0,0,-126,126,126

   80VDU23,128,255,0,255,0,255,0,255,0,23,129,24,0,60,
0,126,0,255,0
   90DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19
2,128,12,7,7,135,195,51,119,102,119,14,14,22,56,204,10
2,238,119
  100DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19
2,128,12,22,22,22,7,3,17,17,17,14,14,14,134,12,136,136
,204
  110DATA119,51,51,32,112,48,16,3,238,204,204,192,192,
192,128,12,7,7,134,193,51,102,119,238,14,14,30,60,204,
238,102,238
  120DATA119,51,51,32,112,48,16,3,238,204,204,192,192,
192,128,12,7,7,7,22,3,17,17,51,134,134,134,14,12,136,1
36,136
  130DATA119,51,51,48,48,176,144,131,238,204,204,192,1
92,192,128,12,135,7,7,7,3,34,102,0,14,30,30,30,28,68,6
8,102
  140DATA119,51,51,48,48,48,16,3,238,204,204,192,192,2
08,144,28,7,135,135,135,131,34,34,102,30,14,14,14,12,6
8,102,0
  150DATA&11,0,1,0,120,0,1,0
  160DATA0,17,136,0,68,0,0,68,0,17,0,34,0,0,68,0
  170DATA0,0,1,0,20,0,3,0
  180DIM G% 6000:FORT=0TO222:READD:?T?G%=D:NEXT:J%=G%+3
00:M1=G%:M2=M1+64:M3=M2+64:S0=M3+64:PEP=S0+8:S02=PEP+1
6:TEMP=S02+8
  190FORT=0TO2STEP2:P%=J%:[OPTT
  200LDA#G% MOD256:STA&70:LDA#G% DIV256:STA&71:LDA#&80
:STA&72:LDA#&73:STA&73:LDA#0:STA&60:STA&D02:STA&D03:ST
A&D04:STA&D05:STA&76:STA&D06:STA&D56:STA&D5B
  210LDA#0:STA&A7:JSRL%:SEC:LDA&B0:SBC#5:STA&B0:JSRSCO
RE
  220.start JSRDIS
  230LDY#0:.wrT LDA&D50,Y:AND#240:CMP#96:BNEngs:JSRBUR
G:.hgs INY:CPY#8:BNEwrT
  240LDA&D58:CMP#0:BEQtS:JSRMOBU:.tS
  250JSRI%
  260LDX#0:JSRflorr:CPX#&FF:BNEyr:RTS:.yr DEC&A3:LDX#0
:JSRflorr:CPX#&FF:BNEry:RTS:.ry INC&A3:INC&A3:LDX#0:JS
Rflorr:CPX#&FF:BNEYR:RTS:.YR DEC&A3
  270JSRdelay
  280LDA&D58:CMP#0:BEQtTS:JSRMOBU:.tTS
```



This program is available on Telsoft.

Brian Lewis finds a difference at Macdonalds.

a second egg is introduced. My first major problem was to find a workable algorithm for the movement of the egg. I ended up partly pinching an idea I had seen in a friend of mine's game "Monsters" which he wrote some time ago on the Atom. The basic idea is that the egg or eggs check whether or not you are on the same level as them — if so they move towards you or else they move about randomly until they find a ladder and then, depending on your position, move up or down. Thanks to Andrew Greene for the idea.

The next problem was the movement of the two burgers. I solved this by setting aside eight memory locations, each containing a number which corresponds to the piece of burger and the extent to which it has been walked on. These memory locations are then moved around after the piece of burger has stopped moving. You have an advantage over Freda — the ability to drop one level and leave the egg stranded on a platform. However, this advantage is slowly taken away from you as you go through the six sheets. Any BBC users who wish to play the game will have to increase the numbers held in the X and Y registers in the "delay" routine and thus slow down the game. Each of the four programs should be typed in, checked, saved and then run to ensure you do not get a bad program. ■

```
  260.rub CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&4
E:LDY#0:.D LDA(&A6),Y:AND#15:STA(&A0),Y:INY:CPY#16:BNE
D:.E LDA(&A6),Y:AND#15:STA(&4D),Y:INY:CPY#32:BNEE:RTS
  270.read CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&
4E:LDY#0:.F LDA(&A0),Y:STA(&A6),Y:INY:CPY#16:BNEF:.G L
DA(&4D),Y:STA(&A6),Y:INY:CPY#32:BNEG:RTS
  280.LADDR JSRfloor:CPX#&FF:BNE9S:LDA&76:CMP&A3:.9S B
EQend:LDA#&FF:STA&A5:LDA&A3:CMP&76:BMInoup:JSRdown:JMP
NOw:.noup JSRup:.NOw:RTS
  290.up SEC:LDA&A0:SBC#&40:STA&4D:LDA&A1:SEC#1:STA&4E
:JSRcheck:CPX#&FF:BEQend:INC&A3:SEC:LDA&A0:SBC#&40:STA
&A0:LDA&A1:SBC#1:STA&A1:JMPread
  300.down CLC:LDA&A0:ADC#&C0:STA&4D:LDA&A1:ADC#3:STA&
4E:JSRcheck:CPX#&FF:BEQend:DEC&A3:CLC:LDA&A0:ADC#&40:S
TA&A0:LDA&A1:ADC#1:STA&A1:JMPread
  310.end LDA#0:STA&A5:RTS
  320.SEE LDY#4:LDA(&A6),Y:CMP#7:BEQFOUN:RTS:.FOUN LDA
#&FF:STA&A5:RTS
  330.floor LDA&A3:.IO CMP#0:BEQon:SEC:SBC#7:CMP#22:BP
L off:JMPIO:.off LDX#0:RTS:.on LDX#&FF:RTS
  340.SAME LDX#0:LDA&D58:CMP#0:BEQa1:RTS:.a1 LDX#&FF:R
TS
  350.1% LDY#0:.AaA LDA&D70,Y:STA&A0,Y:INY:CPY#8:BNEAa
A:JSRrout:LDY#0:.BbB LDA&A0,Y:STA&D70,Y:INY:CPY#8:BNEB
bB
  360LDA&BA:CMP#0:BEQRWR:
  370LDY#0:.CcC LDA&D78,Y:STA&A0,Y:INY:CPY#8:BNECcC:JS
Rrout:LDY#0:.DdD LDA&A0,Y:STA&D78,Y:INY:CPY#8:BNEDdD:.
RWR RTS
  380]:NEXT
  390MODE4
  400PRINTTAB(14,2);"Burger King!"
  410PRINT''"You (GORDON BLUE the chef) must go roundt
he screen knocking down pieces of the burgers to form
 two stacked burgers in the bottom trays."
  411PRINT'
  420PRINT"However a rampart fried egg (FREDA) is try
ing to stop you in your task,if she touches you then
you loose one of your lives an the burgers are reset.
"
  421PRINT'
  430PRINT"There are six screens each of which getspro
gressively harder as you slowly looseyour advantages o
ver FREDA,your advantage being the ability to
drop one level without killing yourself,drop any futhe
r and it's bye bye."
  440PRINTTAB(5);"The controls are :-"
  441PRINT'
  450PRINT'Z - Left , X - Right , * - UP , / - DOWN"
  460VDU28,0,31,39,28,17,129,17,0,12
  470CHAIN""
```

```
  290JSRSEE:CPX#&FF:BNEgs:LDA#&FF:STA&D04:INC&D05:DEC&
76:JSRdrop:JMPhy:.gs LDA&D05:CMP#8:BMIhE:RTS:.hE LDA#0
:STA&D04:STA&D05:.hy
  300LDA&D59:CMP#&FF:BEQuYS:LDA&D58:CMP#0:BNEuYS:JSRse
e:.uYS
  310LDA&D04:CMP#&FF:BNEHYS:JMPnole:.HYS
  320LDA&D02:CMP#38:BEQnori:LDA#&B1:LDX#&BD:LDY#&FF:JS
R&FFF4:CPY#&FF:BNEnori:JSRrub:LDA&D03:CMP#0:BEQrig:LDA
#M1 MOD256:STA&70:LDA#M1 DIV256:STA&71:LDA#0:STA&60:LD
A#0:STA&D03:.rig
  330JSRani:INC&D02:CLC:LDA&72:ADC#8:STA&72:LDA&73:ADC
#0:STA&73:JSRread
  340.nori LDA&D02:CMP#0:BEQnole:LDA#&B1:LDX#&9E:LDY#&
FF:JSR&FFF4:CPY#&FF:BNEnole:JSRrub:LDA&D03:CMP#1:BEQle
f:LDA#M2 MOD256:STA&70:LDA#M2 DIV256:STA&71:LDA#0:STA&
60:LDA#1:STA&D03:.lef
  350JSRani:DEC&D02:SEC:LDA&72:SBC#8:STA&72:LDA&73:SBC
#0:STA&73:JSRread
  360.nole LDA#&B1:LDX#&B7:LDY#&FF:JSR&FFF4:CPY#&FF:BN
Enoup:JSRCEH:CPX#&FF:BNEnoup:INC&76:JSRrub:LDA&D03:CMP
#2:BEQup:LDA#M3 MOD256:STA&70:LDA#M3 DIV256:STA&71:LDA
#0:STA&60:LDA#2:STA&D03:.up
  370JSRani:SEC:LDA&72:SBC#&40:STA&72:LDA&73:SBC#1:STA
&73:JSRread
  380.noup LDA#&B1:LDX#&97:LDY#&FF:JSR&FFF4:CPY#&FF:BN
Enodow:JSRcheck:CPX#&FF:BNEnodow:DEC&76:JSRrub:LDA&D03
:CMP#2:BEQdow:LDA#M3 MOD256:STA&70:LDA#M3 DIV256:STA&7
1:LDA#0:STA&60:LDA#2:STA&D03:.dow
  390JSRani:CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC#1:STA
&73:JSRread
  400.nodow
  410LDA&D5B:CMP#8:BNERz:RTS:.Rz JMPstart
  420.rub LDY#0:.A LDATEMP,Y:STA(&72),Y:INY:CPY#16:BNE
A:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.A1 LD
ATEMP,Y:STA(&4D),Y:INY:CPY#32:BNEA1:RTS
  430.ani LDX#SO MOD256:LDY#SO DIV256:LDA#7:JSR&FFF1:L
DA&60:CMP#1:BEQB:CLC:LDA&70:ADC#32:STA&70:LDA&71:ADC#0
:STA&71:LDA#1:STA&60:RTS
  440.B SEC:LDA&70:SBC#32:STA&70:LDA&71:SBC#0:STA&71:L
DA#0:STA&60:RTS
  450.delay LDX#80:.D LDY#90:.E DEY:BNEE:DEX:BNED:RTS
  460.read LDY#0:.F LDA(&72),Y:STATEMP,Y:INY:CPY#16:BN
EF:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.G LD
A(&4D),Y:STATEMP,Y:INY:CPY#32:BNEG:RTS
  470.check LDX#0:CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC
#2:STA&4E:LDY#0:LDA(&4D),Y:CMP#1:BEQH:RTS:.H LDX#&FF:R
TS
  480.CEH LDX#0:SEC:LDA&72:SBC#&40:STA&4D:LDA&73:SBC#1
:STA&4E:LDY#0:LDA(&4D),Y:CMP#1:BEQH:RTS
  490.SEE CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC#2:STA&4
E:LDY#4:LDA(&4D),Y:CMP#0:BEQH:RTS
  500.drop JSRrub:CLC:LDA&72:ADC#&40:STA&72:LDA&73:ADC
#1:STA&73:JMPread
  510.DIS LDY#0:.a LDA(&70),Y:STA(&72),Y:INY:CPY#16:BN
Ea:CLC:LDA&72:ADC#&30:STA&4D:LDA&73:ADC#1:STA&4E:.b LD
A(&70),Y:STA(&4D),Y:INY:CPY#32:BNEb
```

(continued on page 71)

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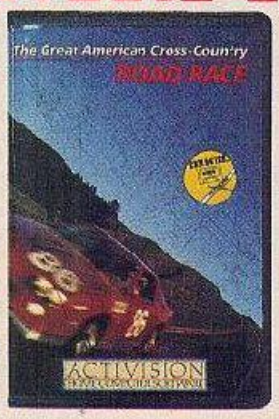

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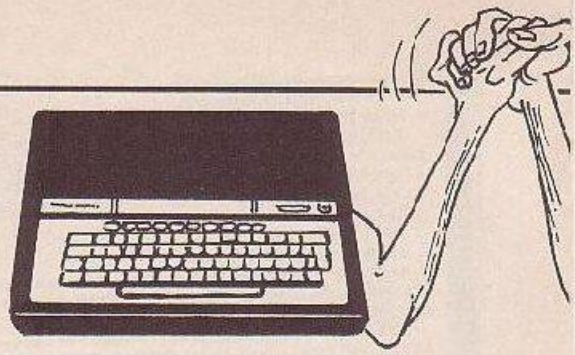
(continued from page 69)

```
520RTS
530.scroll JSRSCORE:LDY#7:CLC:LDA&72:ADC#&80:STA&4D:
LDA&73:ADC#2:STA&4E:LDA(&4D),Y:PHA:LDY#6:.e LDA(&4D),Y
:INY:STA(&4D),Y:DEY:DEY:CPY#&FF:BNEe:LDY#0:TYA:STA(&4D
),Y:LDA&4D:STA&6D:LDA&4E:STA&6E:CLC:LDA&4D:ADC#&40:STA
&4D:LDA&4E:ADC#1:STA&4E
540LDY#0:P.A
550STA(&4D),Y:RTS
560.see CLC:LDA&72:ADC#&80:STA&4D:LDA&73:ADC#2:STA&4
E:LDY#0:LDA(&4D),Y:AND#240:CMP#0:BEQqW:JSRscroll:JSRWH
ER:.qW RTS
570.WHER LDY#0:LDA#18:CMP&D02:BPLover:LDY#4:.over LD
A#21:.OV STA&4D:LDA&76:CMP&4D:BEQfoun:INY:SEC:LDA&4D:S
BC#7:CMP#249:BNEOV:RTS
580.foun LDA&D50,Y:STA&4D:AND#240.CLC:LSRA:LSRA:LSRA
:LSRA:TAX:INX:TXA:CLC:AS.A:ASLA:ASLA:ASLA:STA&4E:LDA&4
D:AND#15:ORA&4E:STA&D50,Y:RTS
590.BURG CPY#3:BEQrew:CPY#7:BEQrew:TYA:TAX:INX:LDA&D
50,Y:AND#15:STA&A5K,X:.rew TYA:PHA:LDA&D50,Y:STA&4D:.D
X#2:LDA#18:CMP&D02:BPLOVE:LDX#15
600.OVE LDA&D50,Y:AND#15:STA&D50,Y:CPY#0:BEQa1:CPY#4
:BEQa1:CPY#1:BEQa2:CPY#5:BEQa2:CPY#2:BEQa3:CPY#6:BEQa3
:CPY#3:BEQa4:CPY#7:BEQa4:RTS
610.a1 LDY#3:JMPa5:.a2 LDY#10:JMPa5:.a3 LDY#17:JMPa5
:.a4 LDY#24:.a5
620SI&&90:STY&91:JSRfill:PLA:TAY:STY&92
630.print LDA&D50,Y:AND#15:CMP#0:BEQb1:CMP#1:BEQb2:C
MP#2:BEQb3:CMP#3:BEQb4
640.b1 LDA#130:STA&960:LDA#131:STA&961:LDA#132:STA&9
62:LDA#2:STA&4D:LDA#128:STA&4E:JMPb5:.b2 LDA#133:STA&9
60:STA&961:STA&962:LDA#2:STA&4D:LDA#128:STA&4E:JMPb5
650.b3 LDA#134:STA&960:LDA#135:STA&961:LDA#136:STA&9
62:LDA#3:STA&4D:LDA#128:STA&4E:JMPb5:.b4 LDA#137:STA&9
60:LDA#135:STA&961:LDA#138:STA&962:LDA#2:STA&4D:LDA#12
8:STA&4E:.b5 LDA#17:JSR&FFEE:LDA&4D:JSR&FFEE:LDA#17:JS
R&FFEE:LDA&4E:JSR&FFEE
660LDA#31:JSR&FFEE:LDA&90:JSR&FFEE:LDA&91:JSR&FFEE:L
DY#0:.resY LDA&960,Y:JSR&FFFF:INY:CPY#3:BNEresY:INL&D5
8:RTS
670.3rUB LDA#17:JSR&FFEE:LDA#128:JSR&FFEE:LDA#31:JSR
&FFEE:TXA:JSR&FFEE:INY:TYA:JSR&FFEE:LDA#32:JSR&FFEE:JS
R&FFEE:JMP&FFCC
680.MOBJ LDX&90:LDY&91:DEY:JSRBrUB:LDY&92:INC&91:JSR
print:JSR3OT:LDA&D58:CMP#6:BNEhSa:JSRsEE3:.hSa LDA&D58
:CMP#7:BEQeND:RTS
690.eND LDY&92:LDA#0:STA&D58:LDA&D50,Y:AND#15:STA&D5
0,Y:STA&4D:LDA&D59:CMP#&FF:BNEHS:INC&92:LDY&92:LDA&D50
,Y:ORA#96:STA&D50,Y:LDA#0:STA&D59:JMPsou:.HS LDY#0:.jh
LDA&DC0,Y:AND#240:ORA&A50,Y:STA&D50,Y:INY:CPY#8:BNEjh
:RTS
700.sEE3 LDA#31:JSR&FFEE:LDA&90:JSR&FFEE:LDX&91:INX:
TXA:JSR&FFEF:LDA#135:JSR&FFF4:CPX#128:BEQqz:LDA#&FF:ST
A&D59:STA&D5A:.qz RTS
710.BOT LDA#25:CMP&91:BPLtYS:LDA#31:JSR&FFEE:LDA&90:
JSR&FFEE:LDY&91:INY:TYA:JSR&FFEE:LDA#135:JSR&FFF4:CPX#
32:BEQtYS:LDA#7:STA&D58:INC&D5B:JSRSCORE:JSRSCORE:JSRS
CORE:JSRSCORE:.tYS RTS
720.fill LDA&D5A:CMP#&FF:BEQaz:LDA#17:JSR&FFEE:LDA#1
28:JSR&FFEE:LDA#17:JSR&FFEE:LDA#1:JSR&FFEE:LDA#31:JSR&
FFEE:TXA:JSR&FFEE:TYA:JSR&FFEE:LDA#128:JSR&FFEE:JSR&FF
EE:JSR&FFEE:.az LDA#0:STA&D5A:INC&91:RTS
730.sou LDA#7:LDX#&02 MOD256:LDY#&02 DIV256:JMP&FFF1
740.florr LDA&A2:CMP&D02:BNEaA1:LDA&A3:CMP&76:BNEaA1
:LDX#&FF:RTS:.aA1 LDY&A2:INY:CPY&D02:BNEiS:LDA&A3:CMP&
76:BNEiS:LDX#&FF:RTS:.iS DEY:DEY:CPY&D02:BNEsI:LDA&A3:
CMP&76:BNEsI:LDX#&FF:RTS:.sI RTS
750.SCORE LDA#17:JSR&FFEE:LDA#3:JSR&FFEE:CLC:LDA&B0:
ADC#5:STA&B0:CMP#10:BNESHOW:LDA#0:STA&B0:INC&B1:LDA&B1
:CMP#10:BNESHOW:LDA#0:STA&B1:INC&B2:LDA&B2:CMP#10:BNES
HOW:LDA#0:STA&B2:INC&B3:LDA&B3:CMP#10:BNESHOW:LDA#0:ST
A&B3:INC&B4
760.SHOW LDY#0:LDX#12:.vinc LDA#31:JSR&FFEE:TXA:JSR&
FFEE:LDA#31:JSR&FFEE:LDA&B0,Y:CLC:ADC#48:JSR&FFEE:INY:
DEX:CPY#5:BNEvinc:RTS
770]:NEXT:CHAIN""
```

Listing 4.

```
10VDU23,142,0,31,31,63,63,255,255,255
20VDU23,143,0,126,189,219,231,231,219,189
30VDU23,144,0,31,127,255,255,255,255,127
40VDU23,145,0,255,255,255,255,63,31,15
41VDU23,146,0,1,3,7,7,31,15,63,23,147,63,63,31,63,1
27,63,31,31
42VDU23,148,31,63,63,63,127,63,127,63,23,149,63,31,
31,15,7,3,3,0
50MODE5:VDU23;8202;0;0;0;0;19,1,4;0;
60DIMA$(3):A$(0)=CHR$130+CHR$131+CHR$132:A$(1)=CHR$
133+CHR$133+CHR$133:A$(2)=CHR$134+CHR$135+CHR$136:A$(3
)=CHR$137+CHR$135+CHR$138
70DATA2,2,3,2
80PROCDEMO
90COLOUR128:CLS:lives%=3:SC%=0:FORT=0TO4:?&B0=0:NE
XT
100RESTORE70:FORT%=0TO3:READD:COLOURD:PRINTTAB(8,T%+
14);A$(T%);:NEXT
110FORG=0TO1000:NEXT:SOUND0,1,4,4
111VDU5:GCOL0,0:MOVE640,576:VDU146,10,8,147,10,8,148
,10,8,149,10,8
120VDU4:COLOUR3:PRINTTAB(5,6);"SHEET NO.";SC%+1
130FORG=0TO1000:NEXT:CLS
140FORT%=0TO31:T%?(G%-224)=0:NEXT
150FORT%=0TO7:A%=T%:IF A%>3 A%=(A%-4)
160T%?&D50-A%:T%?&D50=A%:NEXT
170FORT%=0TO31:T%?(G%+224)=0:NEXT:FORT%=1TO3:VDU19,T
%,0;0;:NEXT
180COLOUR1:FORT%=3TO24STEP7:PRINTTAB(0,T%);STRING$(2
0,CHR$128);:NEXT
181IF SC%>4 THEN ?&BA=1 ELSE ?&BA=0
190IF SC%<4 PRINTTAB(8,3);"    "
200IF SC%<2 THEN PRINTTAB(8,17);" "
210FORT%=1TO9:PRINTTAB(1,T%);CHR$129TAB(7,T%);CHR$12
9TAB(18,T%);CHR$129:NEXT
220FORT%=8TO16:PRINTTAB(9,T%);CHR$129:IF SC%<4 THEN
PRINTTAB(13,T%);CHR$129
230NEXT
240FORT%=15TO23:PRINTTAB(1,T%);CHR$129TAB(7,T%);CHR$
129;TAB(18,T%);CHR$129;:NEXT
250IF SC%>0 AND SC%<4 THEN FORT%=8TO16:PRINTTAB(7,T%
);CHR$129:NEXT
260IF SC%>=3 THEN FORT%=1TO9:PRINTTAB(13,T%);CHR$129
:NEXT
270RESTORE70:FORT%=3TO24STEP7:READD:COLOURD:PRINTTAB
(2,T%);A$((T%-3)/7);TAB(15,T%);A$((T%-3)/7);:NEXT
280COLOUR3:VDU31,2,31,139,140,141,31,15,31,139,140,1
41
290PRINTTAB(8,25);"Lives":COLOUR1:PRINTTAB(10,27);li
ves%:COLOUR2:PRINTTAB(8,29);"Score"
300RESTORE310:FORT%=1TO3:READD:VDU19,T%,D;0;:SOUND&1
1,1,T%*70,5:FORG=0TO1000:NEXT,
310DATA4,3,7
320CALLJ%
330*FX15,0
340IF ?&D5B=8 THEN 390
350COLOUR128:SOUND0,1,255,255
360FORT%=0TO10:FORG=0TO30:NEXT:VDU19,0,1;0;:SOUND&11
,2,30,20:FORG=0TO30:NEXT:VDU19,0,0;0;:NEXT:*FX21,5
370lives%=lives%-1:IF lives%=-1 THEN 420
380COLOUR128:CLS:GOTO150
390FORT%=0TO255STEP5:SOUND1,1,T%,1:NEXT
400SC%=SC%+1:VDU28,0,31,19,25:FORT%=1TO8:PRINTTAB(0,
0);CHR$11;:SOUND&11,1,T%*20,15:NEXT:VDU26:*FX21,5
410CLS:GOTO100
420CLS:COLOUR2:PRINTTAB(5,16);STRING$(10,CHR$133);:A
$="GAME  OVER":COLOUR1:FORT%=1TOLENA$
430PRINTTAB(T%+4,16);MID$(A$,T%,1)
440SOUND&11,2,T%+25,6:FORG=0TO200:NEXT,
450*FX15,1
460COLOUR3:PRINTTAB(0,18);"PRESS SPACE TO START"
470A$=INKEY$(500):IF A$="" THEN PROCDEMO ELSE GOTO90
480GOTO90
490DEFPROCDEMO:?&BA=0
500CLS
510COLOUR1:PRINTTAB(0,12);STRING$(20,CHR$128);
520COLOUR2:PRINTTAB(8,12);A$(1):COLOUR3:PRINTTAB(8,1
3);A$(2):COLOUR2:PRINTTAB(8,14);A$(3)
530COLOUR3:PRINTTAB(3,19);"KISS YOUR YOKE":COLOUR2:P
RINTTAB(6,21);"GOOD BYE":COLOUR1:PRINTTAB(7,23);"SUCKE
R"
540CALLU%:?&D70=&80:?&D71=&64:?&D74=0:?&D72=1:?&D02=
39
550FORT%=0TO5000:NEXT
560FORT%=0TO17:CALLJ%
570SOUND&11,1,25,10
580FORG=0TO50:NEXT,
590FORT%=0TO700:NEXT:COLOUR2:FORT%=0TO10
600PRINTTAB(8,T%);A$(0)
610FORT=0TO60:NEXT:SOUND&11,2,T%*20,10
620PRINTTAB(8,T%);"    ";:NEXT
630PRINTTAB(8,T%);A$(0):COLOUR3:PRINTTAB(7,10);"\'TA
B(4,9);"AHH!"
640FORT%=0TO13000:NEXT
650CLS:RESTORE70:FORT%=0TO3:READD:COLOURD:PRINTTAB(2
,T%);A$(T%);TAB(15,T%);A$(T%);:NEXT
660COLOUR3:PRINTTAB(5,0);"PREPARE TO":COLOUR2:PRINTT
AB(6,1);"MEET THY":COLOUR1:PRINTTAB(8,2);"DOOM"
670FORT%=0TO27:PRINTTAB(0,0);CHR$11:SOUND&11,1,T%*8,
1:FORG=0TO50:NEXT,
680PRINTTAB(19,31):SOUND0,-15,5,5:FORG=0TO90:NEXT
690PRINTTAB(0,0);CHR$11:SOUND0,-15,5,5:FORG=0TO90:NE
XT
700FORG=0TO100:NEXT:A$="IN BRIAN LEWIS'S":B$="ALL NE
W!":C$="BURGER KING!"
710FORT%=1TOLENA$:PRINTTAB(1+T%,10);MID$(A$,T%,1);:S
OUND&11,2,T%*20,1:FORG=0TO90:NEXT,
720COLOUR2:FORT%=1TOLENB$:PRINTTAB(5+T%,12);MID$(B$,
T%,1);:SOUND&11,2,T%*20,1:FORG=0TO60:NEXT,
730COLOUR3:FORT%=1TOLENC$:PRINTTAB(3+T%,14);MID$(C$,
T%,1);:SOUND&11,2,T%*20,1:FORG=0TO60:NEXT,
731*FX15,1
740PRINTTAB(0,23);"PRESS SPACE TO START":REPEAT:UNTI
L GET=32
750CLS:ENDPROC
```

CORE



Jon Cottrell makes war, not love, on his BBC.

MOST PROGRAMMERS seem to play arcade games in their spare hours, but now, from America, the land of hacking, the Big Mac and War Games comes the new line in strategy games — Core Wars.

I first came across the idea of Core Wars in, unsurprisingly, an American magazine, *Scientific American*, a few months ago. The idea seemed excellent, so I dug out my Advanced User Guide, and put together this half Basic, half machine code version of Core Wars, to the best of my knowledge, the first version in this country.

The game scenario is original — the Americans have succeeded in penetrating a giant Russian mainframe, and each player is trying to cause his opponent's program to crash, by the simple means, familiar to all machine code junkies, of making it execute an illegal instruction.

In Core Wars, two programs try to deliberately corrupt each other. A number of techniques have been developed so far; there are the simple methods like overwriting sections of memory at random, or alternatively, "intelligent" methods involving searching out the opposing program. Most people who have written machine code will be familiar with the problem — an incautiously calculated jump, and the processor is trying to execute data rather than a program, with unpredictable and surprising results.

This means the game is played by two players. Each writes a program, of maximum length 100 lines, in a specially-developed language called Redcode, which looks rather like a stripped-down assembly language. These programs are then assembled; play takes place in a memory space of the 3000 locations in the "core" from which the game takes its name — core is a now obsolete term once used to describe a computer's memory space — and each location can contain either a single Redcode instruction, or a piece of data.

If you try to execute data as an instruction, the program will not recognise it, and the opposing one will win! The core is organised slightly differently from a present-day memory, in that core location 2999 "wraps round" and is next to location 0. This means that attempting to access location 3000 results in accessing location 0, and so on. Then play starts for real — the computer executes one instruction from each player's program in turn, rather in the manner of a time-sharing system. Play continues until one program is forced to crash by executing an invalid instruction, and so the other player wins.

Obviously, one simple tactic is just to write a program that overwrites various areas of memory at random, hoping to score a 'hit' on a vital part of the other program, making it crash when it tries to execute that part. But an experienced player could find a way round such an attack — if he set up a block of memory with known contents, which was continuously checked, as soon as a byte was corrupted, he could arrange for his program to transfer itself somewhere in memory less vulnerable, and start a counter-attack.

Easy to pick up

The sort of instructions used will be immediately familiar to anyone who has dabbed in machine code, but don't despair if you never adventured beyond Basic — the limited instruction set will be easy to pick up, and will leave you with some knowledge of the techniques used in genuine machine code. At this point it seems appropriate to describe briefly the instruction set and some details of how the instructions are assembled, and then run through how to use the program.

Each instruction has a code, as for any assembly language, also a mnemonic. The mnemonic is what you might consider the 'real' instruction — it is the mnemonic that you type in to the computer as a line of your Redcode program. The instructions are dealt with in numerical order of code.

Each instruction has either one or two "arguments" — the numbers that follow the mnemonic. The largest argument allowed is 3000 — anything larger will be reduced modulus 3000. Negative arguments are assembled in "complement form"; i.e. an argument of −1 becomes 2999, since subtracting 1 has the same effect as adding 2999 in a core of 3000 contiguous locations.

0 — DAT — Used for putting data in a location. Although this instruction has a code of 0, it is a special case, as it assembles as an unexecutable instruction followed by the byte of data. Strictly speaking, any location in the core containing an unexecutable statement followed by data could be regarded a data statement, but DAT is provided to actually store data in specified locations. It takes one argument.

1 — MOV — Moves data from one location to another. It takes two arguments, so the format is MOV a,b. It will move the contents of location a to location b, without affecting the contents of a.

1 — ADD — This instruction takes two arguments, which makes its format ADD a,b. It adds the contents of location a to the contents of location b, leaving the result as the new contents of b, and leaving the contents of a unchanged.

3 — SUB — Takes two arguments, so its format is SUB a,b. The effect is to subtract the contents of location a from location b, leaving the contents of a unchanged.

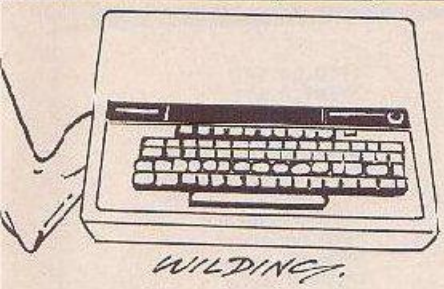
4 — JMP — Has but one argument, which makes its format JMP a. It is an unconditional jump to location a — used for the same purpose as Goto in Basic, but is relative rather than absolute, as explained below.

5 — JMZ — This is a conditional jump instruction which takes two arguments, making its format JMZ a,b. If the contents of location b is 0, the program will jump to relative location a — otherwise it will carry on with the next instruction after the JMZ.

6 — JMG — As above, except that a jump occurs if the contents of location b is greater than zero.

7 — DJZ — Takes two arguments, making

```
  100ON ERROR RESTORE:VDU
26:CLS:CLEAR:RUN
  200IM code 1000.table
17,arg 8,PC(1),IN$(8),B$(
1)
  300IM mode 1.gover 0,a
rgL 1,argH 1,mask 1,data
1,PC 1
  400current=&74:?mask=15
:mask?1=240
  500IM row 0,col 0,flag
0
  600IM base 11999,p$(1,
100),E(1),ad(1)
  700OR LL=0 TO 2 STEP 2
  800P%=code
  900 OPT LL
 100.convert LDA &70
 110CLC:ROL A
 120STA &72
 130LDA &71
 140ROL A
 150STA &73
 160CLC:DEY
 170LDA &72
 180ROL A:STA &72
 190LDA &73
 200ROL A
 210STA &73
 220CLC
 230LDA #base MOD 256
 240ADC &72
 250STA &72
 260LDA &73
 270ADC #base DIV 256
 280STA &73
 290RTS
 300.get LDA (current),Y
 310STA argL,X
 320TYA:PHA
 330LDY #3
 340LDA (current),Y
 350AND mask,X
 360CPX #1
 370BNE .tran
 380CLC:ROR A:ROR A
 390ROR A:ROR A
 400.tran STA argH,X
 410LDA PC:CLC
 420ADC argL,X
 430STA argL,X
 440LDA PC+1
 450ADC argH,X
 460STA argH,X
 470JSR sizeck
 480PLA:TAY
 490RTS
 500.getbyte LDA data
 510STA &70
 520LDA data+1
 530STA &71
 540LDY #2
 550LDA (&70),Y
 560STA data
 570INY
 580LDA (&70),Y
 590STA data+1
 600RTS
 610.start LDA PC
 620STA &70
 630LDA #0
 640STA flag
```



WARS

the format DJZ a,b. The effect is to decrement the contents of location b by one, then jump to location a if the contents of location b is now 0.

8 — CMP — this also has two arguments, so its format is CMP a,b. It compares the contents of location a and location b, and if they are not equal to each other, the computer will skip the next instruction, and continue execution with the one after.

Assumes direct mode

As I have said, arguments lie in the range 0-2999 when assembled, but in addition, each can take one of three modes, called addressing modes. These modes are immediate, direct and indirect. Unless you specify otherwise, the computer assumes the argument is in direct mode. Prefixing the argument with # means it is immediate, and prefixing with @ means it is indirect. Taking as an example the complete instruction MOV 0,1 the full effect would be:

(1) The computer finds neither argument has a prefix, so assumes both are direct.

(2) It therefore adds the first argument onto the current address to find out where to get the data to be moved from, and then adds the second argument onto the current address to find out where to put it.

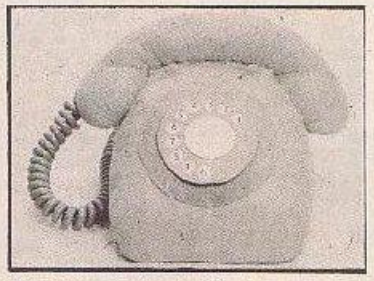
The instruction therefore moves the data 0 locations beyond the instruction — i.e. the instruction itself — to a position 1 location beyond the instruction i.e. in the next location. Incidentally, this is an example of a complete one-line program — when the instruction has been executed, the computer will look for the next instruction, and find the instruction "MOV 0,1" that has been put there by the previous one, and execute this, and this will continue, leaving a trail of MOV 0,1's throughout the core.

Machine code programmers will have noticed that the direct mode, as are all modes, is relative — there is no way for a program to know its absolute address in the core, and the start address for each program within the core is assigned randomly on assembly.

The other two modes I mentioned work as follows — first immediate mode. This causes the argument to be interpreted as a number, rather than an address in core. This means that MOV #3,2 will place the number 3 in the location 2 places further on from the present one, as opposed to MOV 3,2, which would copy the contents of the location three places on from the present one into the location two on from the present one.

Indirect mode is rather more complicated, and is best explained by an example.

ADD @2,4 means "read the contents on location 2. Add this number on to the current location. Now read the contents of this location,



This program is available on Telsoft.

and that is the value to be added to that four locations on from the current one."

So, if you're still with me, type in the program, save it and type Run. After the title page press space and you should see the second screen, headed 'Phase 1 — Realcode entry', and below that, the heading 'Player 1' and an input prompt, '0>'. Here's where you use those instructions I just explained, and type in your program.

Remember, you have a maximum of 100 lines of program each, and each prompt is numbered to show you how you're doing for space.

When you finish your program, press Return in response to the prompt, and then the other player will be given the chance to input his program. After each player enters his program, he is asked to specify which instruction he wishes execution to commence with; in response to the question, enter the number of the instruction you wish to execute first.

When both players have finished, you will be asked to enter the number of turns of execution — i.e. how many instructions the computer is going to execute from each program before it announces a draw.

When both players have entered their code, it is assembled. If an error such as an illegal instruction or format is encountered, the appropriate player has to re-input his code. Assuming no errors are present in either program, however, the game starts in earnest.

This is where I made a major change to the game as I discovered it. Apart from the fact that the original game had no assembler, and the code had to be put together by hand, I have stuck to the original guidelines. But the game as it stood wasn't exactly visual — each player typed in a mass of numbers, sat back and waited. This was all very well in the early days, but now people expect something more in the way of a display.

Semi-graphic display

So to that end, I added a semi-graphic display, which takes the form of an array of graphic blocks, 20 blocks wide by 10 high. Each block represents 15 locations in the core, numbered across the screen, so the top left hand block represents locations 0-14, the top right hand locations 295-299, the bottom left 2700-2714, and the bottom right 2985-2999. When the game starts, the area occupied by player one's code is shown in red, and that occupied by player two's in green.

This is the first time either player can know where their code is in memory. After that, whenever a player's program changes the contents of a location in the core, the block representing that location changes to the appropriate colour, so, if a program is overwriting areas of memory as an attack, it is possible to see how close the attack is to a vital point.

The game ends when one program or the other tries to execute an illegal instruction, or when the set number of turns has elapsed.

```
650STA gover
660LDA PC+1
670STA &71
680JSR convert
690LDA &72
700STA current
710LDA &73
720STA current+1
730LDY #0
740LDA #48
750AND (current),Y
760CMP #32
770BNE nh
780LDA #2
790.nh CMP #16
800BNE nl
810LDA #1
820.nl STA mode
830LDA #192
840AND (current),Y
850CMP #128
860BNE nh1
870LDA #2
880.nh1 CMP #64
890BNE nl1
900LDA #1
910.nl1 STA mode+1
920LDA (current),Y
930AND #15
940CMP #1
950BCC end2
960CMP #5
970BCS end2
980LDX #0
990LDY #1
1000.rep LDA mode,X
1010CMP #1
1020BNE nd
1030JSR get
1040JMP finish
1050.end2 LDA #1
1060STA gover
1070RTS
1080.nd CMP #2
1090BNE imm
1100JSR get
1110LDA argL,X
1120STA &70
1130LDA argH,X
1140STA &71
1150JSR convert
1160LDA &72
1170STA data
1180LDA &73
1190STA data+1
1200JSR getbyte
1210LDA data
1220CLC
1230ADC PC
1240STA argL,X
1250LDA data+1
1260ADC PC+1
1270STA argH,X
1280JSR sizeck
1290.finish DEX #1
1300BEQ exec
1310LDY #2
1320INX
1330JMP rep
1340.imm LDA (current),Y
1350STA argL,X
1360TYA:PHA
```

(continued on next page)

(continued from previous page)

```
1370LDY #3
1380LDA (current),Y
1390AND mask,X
1400STA argH,X
1410PLA:TAY
1420JMP finish
1430.exec LDY #0
1440LDA (current),Y
1450AND #15
1460STA &74
1470CLC
1480ADC &74
1490TAX
1500LDA table,X
1510STA &74
1520INX
1530LDA table,X
1540STA &75
1550JMP (&74)
1560.sizeck LDA argH,X
1570CMP #11
1580BCC clr
1590BNE nce
1600LDA argL,X
1610CMP #185
1620BCC clr
1630.nce LDA argL,X
1640SEC
1650SBC #184
1660STA argL,X
1670LDA argH,X
1680SBC #11
1690STA argH,X
1700.clr RTS
1710.getarg LDA mode,X
1720CMP #0
1730BEQ transfer
1740LDA argL,X
1750STA &70
1760LDA argH,X
1770STA &71
1780JSR convert
1790LDA &72
1800STA data
1810LDA &73
1820STA data+1
1830JSR getbyte
1840LDA data
1850STA argL,X
1860LDA data+1
1870STA argH,X
1880.transfer RTS
1890.inc INC PC
1900BNE return
1910INC PC+1
1920.return LDA PC
1930CMP #185
1940BNE rt
1950LDA PC+1
1960CMP #11
1970BNE rt
1980LDA #0
1990STA PC
2000STA PC+1
2010.rt RTS
2020.zp LDA argL,X
2030STA &70
2040LDA argH,X
2050STA &71
2060JSR convert
2070CPX #0
2080BNE high
2090LDA &72
2100STA &74
2110LDA &73
2120STA &75
2130RTS
2140.high LDA &72
2150STA &76
2160LDA &73
2170STA &77
2180RTS
2190.mov LDA mode
2200BEQ immd
2210LDX #0
2220JSR zp
2230INX
2240JSR zp
2250LDY #0
2260.agn2 LDA (&74),Y
2270STA (&76),Y
2280INY
2290CPY #4
2300BNE agn2
2310JSR inc
2320INC flag
2330RTS
2340.immd LDX #1
2350JSR zp
2360LDY #0
2370TYA
2380.agn3 STA (&76),Y
2390INY
2400CPY #2
2410BNE agn3
2420LDA argL
2430STA (&76),Y
2440INY
2450LDA argH
2460STA (&76),Y
2470JSR inc
2480INC flag
2490RTS
2500.add LDX #0
2510JSR getarg
2520INX
2530JSR zp
2540JSR getarg
2550CLC
2560LDA argL
2570ADC argL+1
2580STA argL
2590LDA argH
2600ADC argH+1
2610STA argH
2620LDX #0
2630JSR sizeck
2640.thn LDA argL
2650LDY #2
2660STA (&76),Y
2670INY
2680LDA argH
2690STA (&76),Y
2700JSR inc
2710INC flag
2720RTS
2730.sub LDX #0
2740JSR getarg
2750LDX #1
2760JSR zp
2770JSR getarg
2780SEC
2790LDA argL+1
2800SBC argL
2810STA argL
2820LDA argH+1
2830SEC argH
2840STA argH:LDX #0
2850JSR sizeck1
2860JMP thn
2870.sizeck1 LDA argH,X
2880CMP #11
2890BCC clr1
2900BNE nce1
2910LDA argL,X
2920CMP #185
2930BCC clr1
2940.nce1 LDA argL,X
2950CLC
2960ADC #184
2970STA argL,X
2980LDA argH,X
2990ADC #11
3000STA argH,X
3010.clr1 RTS
3020.jmp LDA argL
3030STA PC
3040LDA argH
3050STA PC+1
3060RTS
3070.jmz LDX #1
3080JSR getarg
3090.jm LDA argL+1
3100BNE ret2
3110LDA argH-1
3120BNE ret2
3130JMP jmp
3140.ret2 JSR inc
3150RTS
3160.jmc LDX #1
3170JSR getarg
3180LDA argL,X
3190BNE jmp
3200LDA argH,X
3210BNE jmp
3220JMP ret2
3230.djz LDX #1
3240JSR zp
3250JSR getarg
3260LDA argL+1
3270SEC
3280SBC #1
3290STA argL+1
3300LDA argH+1
3310SBC #0
3320STA argH+1
3330JSR sizeck1:LDY #2
3340LDA argL+1
3350STA (&72),Y
3360INY
3370LDA argH+1
3380STA (&72),Y
3390LDA &72
3400STA &76
3410LDA &73
3420STA &77
3430INC flag
3440JMP im
3450.cmp LDX #0
3460JSR getarg
3470INX
3480JSR getarg
3490LDA argL
3500CMP argL+1
3510BNE skip
3520LDA argH
3530CMP argH+1
3540BNE skip
3550JSR inc
3560RTS
3570.skip JSR inc
3580JSR inc
3590RTS
3600.display LDA #0
3610STA row
3620STA col
3630LDA #(HIMEM+160) MOD
256
3640STA &80
3650LDA #(HIMEM+160) DIV
256
3660STA &81
3670LDY #0
3680.agn LDA #150
3690STA (&80),Y
3700JSR inc1
3710LDA #255
3720STA (&80),Y
3730JSR inc1
3740LDA col
3750CMP #19
3760BEQ nrow
3770CLC
3780ADC #1
3790STA col
3800JMP agn
3810.nrow LDA #0
3820STA col
3830LDA row
3840CMP #18
3850BCS end
3860CLC:ADC #2
3870STA row
3880LDA &80
3890CLC
3900ADC #40
3910STA &80
3920LDA &81
3930ADC #0
3940STA &81
3950JMP agn
3960.end RTS
3970.inc1 LDA &80
3980CLC
3990ADC #1
4000STA &80
4010LDA &81
4020ADC #0
4030STA &81
4040RTS
4050]:NEXT LL
4060PROCinit
```

```
4070MODE 7:PROCgame:GOTO 4070
4080DEFPROCgame
4090error%=0:N$=CHR$(32+CHR$(157+CHR$(141+CHR$(131
4100FOR I=0 TO 1:PRINT M$;TAB(15);"CoreWars":NEXT
4110PRINT''''FOR I=0 TO 1:PRINTTAB(8);CHR$(141);CHR$(129
;"(C) JCC '85":NEXT
4120PROCspace
4130PROCmain:ENDPROC
4140DEFPROCmain
4150FOR ZZ=0 TO 1:PROCinput(ZZ):NEXT
4160ad(0)=PC(0)+ad(0):PC(1)=PC(1)+ad(1)
4170FOR ZZ=0 TO 1:PROCassemble(ZZ)
4180IF error%=0 PRINT''CHR$(136);"No errors.":PROCspace
:GOTO 4200
4190PROCerror:PROCinput(ZZ):PROCassemble(ZZ):GOTO 418
0
4200NEXT ZZ
4210VDU 23;8202;0;0;0;
4220CLS:FOR I=0 TO 2:PRINTM$;TAB(5);"Phase 3- Redcode
simulation":NEXT
4230CALL display
4240FOR QX=0 TO 1
4250FOR RX=ad(QX) TO ad(QX)+E(QX) STEP 15
4260PRINTpos(RX)+(145*QX)
4270NEXT RX:NEXT QX
4280FOR I=0 TO CX-1:FOR J=0 TO 1
4290PC=PC(J) MOD 256:PC?1=PC(J) DIV 256
4300CALL start:PC(I)=?PC+256*PC?1
4310IF ?gover=1 CLS:FOR ZZ=0 TO 1:PRINTTAB(11,ZZ+12);
CHR$(141+CHR$(130);"Player ";(I EOR 1)+1;" Wins":NEXT:VDU
7:PROCspace:ENDPROC
4320IF ?flag=0 GOTO 4350
4330X=((?176+256*?177)-base DIV 4
4340?Fpos(QX)=(145+I)
4350NEXT I:NEXT J:CLS:FOR I=0 TO 1:PRINTTAB(14,1+12);
CHR$(141+CHR$(129);"Draw":NEXT:VDU 7:PROCspace:ENDPROC
4360DEFPROCinit
```

```
4370FOR I=0 TO 8:READ N$(I):NEXT
4380FOR I=1 TO 8:L=EVAL N$(I):?(I*2+table)=L MOD 256
4390:?(I*2+table+1)=L DIV 256:NEXT
4400FOR I=0 TO 6:READ b,m,g1,g2:NEXT
4410ENDPROC
4420DEFPROCinput(p)
4430CLS:FOR I=1 TO 2:PRINTM$;TAB(5);"Phase 1- Redcode
entry":NEXT
4440PRINT:FOR I=1 TO 2:PRINTTAB(14);CHR$(141;CHR$(129;"
Player ";(p+1):NEXT
4450c=0:VDU 28,0,24,39,5
4460REPEAT:PRINTTAB(0);;" ";
4470INPUT LINE "" p$:X$=""
4480IF p$="" ELSE c=c-1:GOTO 4560
4490FOR I=1 TO LEN(p$)
4500X$=X$+CHR$(ABS(p$[I]-32))
4510IF ABS(p$[I]-32)=0 OR ABS(p$[I]-32)=59 GOTO 4530
4520NEXT I:p$=p$+" ":GOTO 4530
4530IF LEN(X$)=0 GOTO 4560
4540c=c+1:IF c>100 GOTO 4560
4550UNTIL FALSE
4560IF error%=1 GOTO 4630 ELSE I=p:CLS:PRINT''
4570PRINT"Start instruction player ";I+1;:
4580INPUT PC(I)
4590a=(c+RND(1500)):ad(I)=ad(I)+500+RND(200)
4600IF I=0 GOTO 4630
4610CLS:PRINT''''INPUT "How many turns ",CX
4620IF CX<100 GOTO 4610
4630VDU 26:ENDPROC
4640DEFPROCassemble(p)
4650CLS:FOR I=1 TO 2:PRINTM$;TAB(5);"Phase 2- (p+1);
"- Redcode assembly":NEXT
4660ad=ad(p)
4670FOR c=0 TO E(p)
4680A$=LEFT$(p$[c,c],3)
4690FOR I=0 TO 8
4700IF A$=N$(I) GOTO 4720
```

```
4710NEXT I:PRINT''''"Invalid instruction - ";A$:error
%=1:ENDPROC
4720ad=ad MOD 3000:byte=0
4730B$(0)=RIGHT$(p$[p,c],LEN(p$[p,c])-3):B$(1)="":IF
I=0 B$(1)=B$(2):B$(2)=""
4740IF I?arg=1 GOTO 4790
4750X%=INSTR(p$[c,c],",")
4760IF X%=0 PRINT"Invalid argument":error%=1:ENDPROC
4770B$(0)=MID$(p$[p,c],4,(X%-4))
4780B$(1)=RIGHT$(p$[p,c],LEN(p$[p,c])-(X%))
4790FOR QX=0 TO 1
4800IF LEFT$(B$(QX),1)="#" GOTO 4830
4810IF LEFT$(B$(QX),1)="@" byte=byte+32+VAL(B$(QX)):GOTO 48
30
4820byte=byte+16+VAL(B$(QX)):GOTO 4840
4830B$(QX)=RIGHT$(B$(QX),LEN(B$(QX))-1)
4840NEXT QX
4850addr=ad+base
4860?addr=I+byte
4870?X=VAL(B$(0)) MOD 3000
4880IF B%<0 OR B%>3000:GOTO 4860
4890CX=VAL(B$(1)) MOD 3000
4900IF CX<0 OR CX>3000:GOTO 4900
4910addr73=B% MOD 256
4920addr72=CX MOD 256:IF I=0 addr73=CX DIV 256:GOTO 4
960
4930addr73=(B% DIV 256+(CX DIV 256)+16)
4940ad=ad+1:NEXT c
4950error%=0:ENDPROC
4960DEFPROCspace
4970VDU 23;8292;0;0;0;:PRINTTAB(10,23);CHR$(136;CHR$(12
9;"Press space bar"
4980A=GET:VDU 23;8720;0;0;0;:ENDPROC
4990DEFPROCspace(P)=(A DIV 240)+32+(A DIV 15)MOD 20)+2+H
IMEM+150
5000DATA dat,mov,add,sub,jmz,jmp,djz,cmp
5010DATA 1,2,2,2,1,2,2,2
```

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CBM ROCK F

Listing 2.

```
0 REM*****************************
1 REM*******BY PAUL HANNOND 19.5.85******
2 REM*****************************
10 REM**********SET UP SCREEN**********
12 POKE"J" POKE53281,0 POKE53280,0
20 POKE53272,29:POKE53270,PEEK(53270)OR16
30 POKE53283,1:POKE53284,5
35 DIMSC(10,12)
40 REM*************VARIABLES************
50 M$(1)="[illegible]"
60 R$="[illegible]"
63 N$="[illegible]"
64 O$="[illegible]"
65 D$="[illegible]"
67 LE=1 GOTO800
69 SC=0 SC$="000000" LI=3
70 FORI=1TO10:FORT=1TO11 READS$(I,T) NEXTT NEXTI
90 POKE53282,5 GOSUB1000
95 X=3:Y=2 D=0
110 PRINTLEFT$(U$,Y)SPC(X)M$(1)
120 REM**********SET UP SOUND***********
130 FORI=54272TO54296 POKEI,0 NEXT
140 POKE54278,128 POKE54277,9 POKE54276,17
150 POKE53265,PEEK(53265)OR16
200 REM*************MOVE MAN************
210 SYS49152:SYS49152
214 A=PEEK(1024+X+Y*40-80) IFA=63ANDM=2THEN500
216 PE=PEEK(197):P=0
220 IFPE=45THENP=-2
230 IFPE=50THENP=2
240 IFPE=13THENP=80
250 IFPE=23THENP=-80
255 IFPE=4THEN520
260 IFP=0THEN320
280 A=PEEK(1024+X+Y*40+P) IFA=32ORA=210ORA=67THEN290
285 GOTO320
290 PRINTLEFT$(U$,Y)SPC(X)"[illegible]" M=0:R=1
300 IFP=20ORP=-2THENX=X+P
305 IFP=80THENY=Y+2
306 IFP=-80THENY=Y-2
307 IFY=2THENY=2
312 IFA=67THEND=D+1:GOSUB600:IFD=16THENLE=LE+1:SC=SC+400:GOTO700
320 PRINTLEFT$(U$,Y)SPC(X)M$(R):M=M+1
325 IFR=1ANDM>5THENR=2:GOTO330
326 R=1
330 GOTO200
500 REM*************DEAD MAN************
510 PRINTLEFT$(U$,Y)SPC(X)"[illegible]" :SYS49152
520 POKE54296,15:POKE54276,17 FORI=0TO255STEP20:POKE54273,I NEXTI
530 FORI=255TO0STEP-15:POKE54273,I NEXTI
540 POKE54276,0
550 LI=LI-1 IFLI=0THEN800 REM**TITLE**
560 GOTO90
599 END
600 REM********SOUND FOR DIAMOND********
605 PRINTLEFT$(U$,Y)SPC(X)M$(1)
610 POKE54276,17:POKE54296,15 FORI=230TO90STEP-35 POKE54273,I NEXTI POKE54276,0
615 SC=SC+275:POKE54273,0
620 A$=MID$(STR$(SC),2,LEN(STR$(SC))) SC$=LEFT$("000000",6-LEN(A$))+A$
625 PRINT"[illegible]"SPC(19)SC$
630 RETURN
700 REM*************NEW LEVEL***********
710 POKE54276,17:FORI=0TO15STEP.2 POKE53282,I*5 POKE54273,I NEXTI POKE54276,0
730 GOTO90
800 REM*************TITLE PAGE***********
805 PRINT"[illegible]"
810 PRINT"[illegible]"
811 PRINT"[illegible]"
812 PRINT"[illegible]"
813 PRINT"[illegible]"
814 PRINT"[illegible]"
815 PRINT"[illegible]"
816 PRINT"[illegible]"
817 PRINT"[illegible]"
818 PRINT"[illegible]"
819 PRINT"[illegible]"
820 PRINT"[illegible]"
821 PRINT"[illegible]"
822 PRINT"[illegible]"
823 PRINT"[illegible]"
824 PRINT"[illegible]"
825 PRINT"[illegible]"
826 PRINT"[illegible]"
827 PRINT"[illegible]"
828 PRINT"[illegible]"
829 PRINT"[illegible]"
830 PRINT"[illegible]"
831 PRINT"[illegible]"
832 PRINT"[illegible]" LE=1
833 PRINT"[illegible]" START TO S:REDI"LE;
840 POKE197,0
850 GETA$:IFA$=""THEN850
851 IFA$=" "THEN855
852 LE=LE+1 IFLE=7THENLE=1
853 GOTO830
855 RESTORE
860 FORT=0TO25:READS$:FORT=0TO20 NEXTI NEXTJ GOTO90
999 END
1000 REM*********DRAW SCREEN*********
1001 IF LE=11THENLE=1 SC=SC+600
1005 PRINT"J";
1010 FORI=1TO11 PRINT PRINT"[illegible]" :FORT=1TO19
1020 A$=MID$(S$(LE),I*19+T,1)
1030 IFA$="2"THENPRINTR$;
1040 IFA$="1"THENPRINTW$;
1050 IFA$="3"THENPRINTO$;
1060 IFA$="0"THENPRINTD$;
1080 NEXTT NEXTI
1090 PRINT:PRINT"[illegible]"
1092 PRINT"[illegible]"
1100 A$=MID$(STR$(SC),2,LEN(STR$(SC))) SC$=LEFT$("000000",6-LEN(A$))+A$
1110 PRINT"[illegible]"SPC(13)"SCORE :";SC$ TAB(33)"MEN";LI;"[illegible]SHEET";LE
1200 RETURN
10000 REM*******DATA FOR SCREENS*******
10010 DATAWGGGGGGGGGGGGGGGW,WGGWRRRRGRRRRWGGGW
10011 DATAWGGGWGGGGGGGWRGGW,WWGGGWGGGGGWRGGGW,WGGGGWGGGGGWGRGGW
10012 DATAWGGRGWGDWWGRGGW,WGGGRGDWWWDGRGGW,WRGGGRGWDDWGGRGGW
10013 DATAWRGGGWGRGDRGWGGGW,WGGGWGRRRRGWGGGW,WGRGWGDDRGRDGWGGW
10014 DATAWRWRGGGDDGGRGGRW
10020 DATAWWGRGRGGGGGGGGGW,WGGGGGGRGGRGRGGW,WGGGGRWWWDDWWWDW
10021 DATAWGGDGWGWRGGGRGWGW,WGGGWGWGRGRGGDWW,WGGGGWGWWGGWWWGW
10022 DATAWRRGWGWWRGGRWGWW,WRDRWGWWWGGGWGWW,WRRGWGWGWGIDRWWGW
10023 DATAWGGGRGGWGWGWGGGW,WGGGGGGGGGGDGGGGW
10030 DATAWGGGGRRRRGRRRGGGGW
10031 DATAWGGGDRGRGRGGGGRW
10032 DATAWRGWWWWGWWWWWGGW
10033 DATAWRGWDRGGGGGRDWGGW
10034 DATAWRGWWWGGGGGWWRWGGW
10035 DATAWDGWGGGGGGGGGRWGGW
10036 DATAWGWGRGGGGGGDWGIGW
10037 DATAWRWGGGGGGGGGWRIDW
10038 DATAWGRWGGGRDRGGGGDGRW
10039 DATAWGWGGRRRDRGGRWRGW
10040 DATAWGGGGRRRRRRRRRWGDW
10041 :
10050 DATAWGGRRGGGGGGGGGGGRW
10051 DATAWGGRGGWWWWWWWWWGGW
10052 DATAWGGGRWDRGRRRGGDWDW
10053 DATAWRWGWRGRGGRGRRGWW
10054 DATAWDWGGGGGDDGRDGGWW
10055 DATAWRWGWGGGGGRGDGGGW
10056 DATAWRGGWGGGRRRGGGDIW
10057 DATAWGGRGGWWWWWWWWWRW
10058 DATAWGGGGGGGGDGRGGRGW
10059 DATAWGGGGGGGGGDDGGGGW
10060 DATAWGGGGGGGGGGGGGGIW
10061 : ▸
10070 DATAWGGGGGGGRRGGGGGGGW
10071 DATAWGGGRGGGGGDRGGRGRW
10072 DATAWGGGRWWWWWWWWRGRW
10073 DATAWGGGRGGGRRRDRGDGGW
10074 DATAWGGRGGDGGGDRGGDRGW
10075 DATAWGGWWWWWWWWWWRGGW
10076 DATAWGGGGGRRDDRGGRGGW
10077 DATAWGGDGGGGRRRGGGGDGW
10078 DATAWGRWWWWWWWWWWRGW
10079 DATAWGRGGGRRRGGGGGIGW
10080 DATAWGDGGWWGDGWWGGIGW
10081 :
10090 DATAWGGRRDWGGGWWGGGRW
10091 DATAWGGRRRWGGWWGWRGRW
10092 DATAWGGRRRWGWWIDDRGGGW
10093 DATAWGGRGGWGWGDGDGGGGW
10094 DATAWGGGRRWWWWWWWWWGW
10095 DATAWGGGDDDDGGGDDDGGGW
10096 DATAWGGGRWWWWWWWWWGGW
10097 DATAWGGRGWRGGGGGGRGGW
10098 DATAWRDGRWGRGGGGRGGGW
10099 DATAWRDRGRDRRRRRRGGGW
10100 DATAWRGGRWGGGGGGGGGGW
10101 :
10110 DATAWGGGGGRRRGGGGGGGGW
10111 DATAWGGGGGGRDRGGGGGGRW
10112 DATAWGGRWWWWWWWWWGGGRW
10113 DATAWRGRWRGGRRDWGGGRW
10114 DATAWIRGWDDGGRRWGGGIW
10115 DATAWRGRWGGGGGGWGGGGW
10116 DATAWIRGIWGWWWWGWGGRGW
10117 DATAWIRGIGGWWWWGDGRRGW
10118 DATAWIGWDWWWWWWWWWRWRGW
10119 DATAWRGGGGRRWWGRGRGDGW
10120 DATAWGGGGGGGGDGGGGGGGW
10121 :
10130 DATAWGGGGGGGGGGGGGGGRW
10131 DATAWGGGGRRRRDRGGGGGRW
10132 DATAWGGRGDRRRRRGGGGGRW
10133 DATAWGRGRRRRGRRRRGRRW
10134 DATAWDWGGGGGDDGRDGGWW
10135 DATAWRDGGDGGGGGDGGGGRW
10136 DATAWRGWWWWWGWWWWWGGW
10137 DATAWRGGGGGGGGGGGGRWW
10138 DATAWRGGGGGGGGGGGGGRW
10139 DATAWGGGGGGGGGGGGGGGW
10140 DATAWGGGGGGGGGGGGGGGW
10141 :
10150 DATAWGGGGGGGGGGGGGGGW
10151 DATAWGGGGRRRRDRGGGGGRW
10152 DATAWGGRGDRRRRRGGGGGRW
10153 DATAWGRGRRRRGRRRRGRRW
10154 DATAWDWGGGGGDDGRDGGWW
10155 DATAWRDGGDGGGGGDGGGGRW
10156 DATAWRGWWWWWGWWWWWGGW
10157 DATAWRWGGGGGGGGGGRGWW
10158 DATAWGGGGGGGGGGGGGGGW
10159 DATAWGGGGGGGGGGGGGGGW
10160 DATAWGGGGGGGGGGGGGGGW
10161 :
10170 DATAWGGGGGGGGGGGGGGGW
10171 DATAWGGGGGGGGGGGGGGGW
10172 DATAWRGGGGGGWGWGGGGGW
10173 DATAWDRGGGGGGRGRWGGGGW
10174 DATAWRGGGWGRGDGRWRGGGW
10175 DATAWGRGWGGGGGGGGGRGRW
10176 DATAWRGGWRGRRRRWRRDRW
10177 DATAWGGRGGGGDDDDWDRRRW
10178 DATAWGWDGGGWRRWGGRRDRW
10179 DATAWDGRGGGGWWGGGGGGW
10180 DATAWGWGRGGGGGGGGGGGW
10190 REM*********************
```

Listing 1.

```
10 REM****ROCK FALL M/C AND STARTING***
500 GOTO1200::0
510 READA:IFA=-1THEN600
520 POKEB+C,A:C=C+1 GOTO510
600 A0=49152 :=0
610 READA:IFA=-1THEN800
620 POKEA0+C,A:C=C+1 GOTO610
1000 DATA0,192,110,110,96,96,0,0,24,60,102,126,102,102,102,0
1001 DATA124,102,102,124,102,102,124,0,60,102,96,96,96,102,60,0
1002 DATA120,108,102,102,102,108,120,0,126,96,96,120,96,96,126,0
1003 DATA126,96,96,120,96,96,96,0,60,102,96,110,102,102,57,0
1004 DATA102,102,102,126,102,102,102,0,60,24,24,24,24,24,60,0
1005 DATA30,12,12,12,12,108,56,0,102,108,120,112,120,108,102,0
1006 DATA96,96,96,96,96,96,126,0,99,119,127,107,99,99,99,0
1007 DATA102,118,126,126,110,102,102,0,60,102,102,102,102,102,60,0
1008 DATA124,102,102,124,96,96,96,0,60,102,102,102,102,60,14,0
1009 DATA124,102,102,124,120,108,102,0,60,102,96,60,6,102,60,0
1010 DATA126,24,24,24,24,24,24,0,102,102,102,102,102,102,60,0
1011 DATA102,102,102,102,102,60,24,0,99,99,99,107,127,119,99,0
1012 DATA102,102,60,24,60,102,102,0,102,102,60,24,24,24,24,0
1013 DATA126,6,12,24,48,96,126,0,60,48,48,48,48,48,60,0
1014 DATA12,18,48,124,48,48,252,0,60,12,12,12,12,12,60,0
1015 DATA0,24,60,126,24,24,24,24,0,16,48,127,127,48,16,0
1016 DATA0,0,0,0,0,0,0,0,24,24,24,24,0,0,24,0
1017 DATA102,102,102,0,0,0,0,0,102,102,255,102,255,102,102,0
1018 DATA24,62,96,60,6,124,24,0,98,102,12,24,48,102,70,0
1019 DATA60,102,60,56,103,102,63,0,6,12,24,0,0,0,0,0
1020 DATA12,24,48,48,48,24,12,0,48,24,12,12,12,24,48,0
1021 DATA0,102,60,255,60,102,0,0,0,24,24,126,24,24,0,0
1022 DATA0,0,0,0,24,24,48,0,0,0,0,126,0,0,0,0
1023 DATA0,0,0,0,0,24,24,0,0,3,6,12,24,48,96,0
1024 DATA60,102,110,110,118,102,60,0,0,24,24,56,24,24,24,126,0
1025 DATA60,102,6,12,48,96,126,0,60,102,6,28,6,102,60,0
1026 DATA6,14,30,102,127,6,6,0,126,96,124,6,6,102,60,0
1027 DATA60,102,96,124,102,102,60,0,126,102,12,24,24,24,24,0
1028 DATA60,102,102,60,102,102,60,0,60,102,102,62,6,102,60,0
1029 DATA0,0,24,0,0,24,0,0,0,0,24,0,0,24,24,48
1030 DATA12,24,48,96,48,24,12,0,0,0,126,0,126,0,0,0
1031 DATA13,27,47,175,183,189,181,181,189,173,45,45,43,11,10,2
1032 DATA128,160,232,248,250,124,126,94,94,125,106,122,248,232,224,160
1033 DATA3,5,15,15,61,53,246,214,214,246,53,61,15,15,5,3
1034 DATA192,192,240,192,124,92,159,151,151,159,92,124,192,240,192,192
1035 DATA254,254,254,170,238,190,255,170,170,255,190,238,170,254,254,254
1036 DATA255,255,195,195,195,195,195,195,195,195,195,195,195,195,255,255
1037 DATA195,195,195,195,195,195,195,195,36,60,60,24,126,24,36,102
1038 DATA13,31,51,63,31,15,3,63,63,3,3,7,14,12,12,28
1039 DATA41,240,204,252,248,240,192,252,252,192,192,224,112,48,48,56
1040 DATA232,192,192,224,112,72,60,24,0,0,0,0,0,0,0,0
2000 DATA120,0,162,255,189,213,6,201,62,240,13,201,63,210,9,201
2001 DATA51,240,5,201,65,208,25,234,141,4,206,189,253,6,201,32
2002 DATA238,14,169,32,157,213,6,173,0,203,157,253,6,221,234,234
2003 DATA232,204,255,208,207,200,192,4,210,15,206,6,192,206,29,192
2004 DATA206,60,192,206,41,190,76,2,192,169,6,141,6,192,141,29
2005 DATA192,141,28,192,141,44,192,96,255,255,0,0,255,255,0,0
2006 DATA255,255,0,0,255,2,0,0,255,255,0,0,255,255,0,0,-1
6000 POKE631,78:POKE632,69:POKE633,07:POKE634,13:POKE635,76:POKE636,111
6010 POKE637,13:POKE198,6:POKE631,13:POKE198,1:END
```

FALL

Paul Hammond simulates the laws of gravity on the CBM-64.

ROCK FALL IS A game in which you have to guide a little man around 10 caves collecting the 16 diamonds in each. If you burrow under a rock it will fall on you and kill you unless you move out of the way quickly.

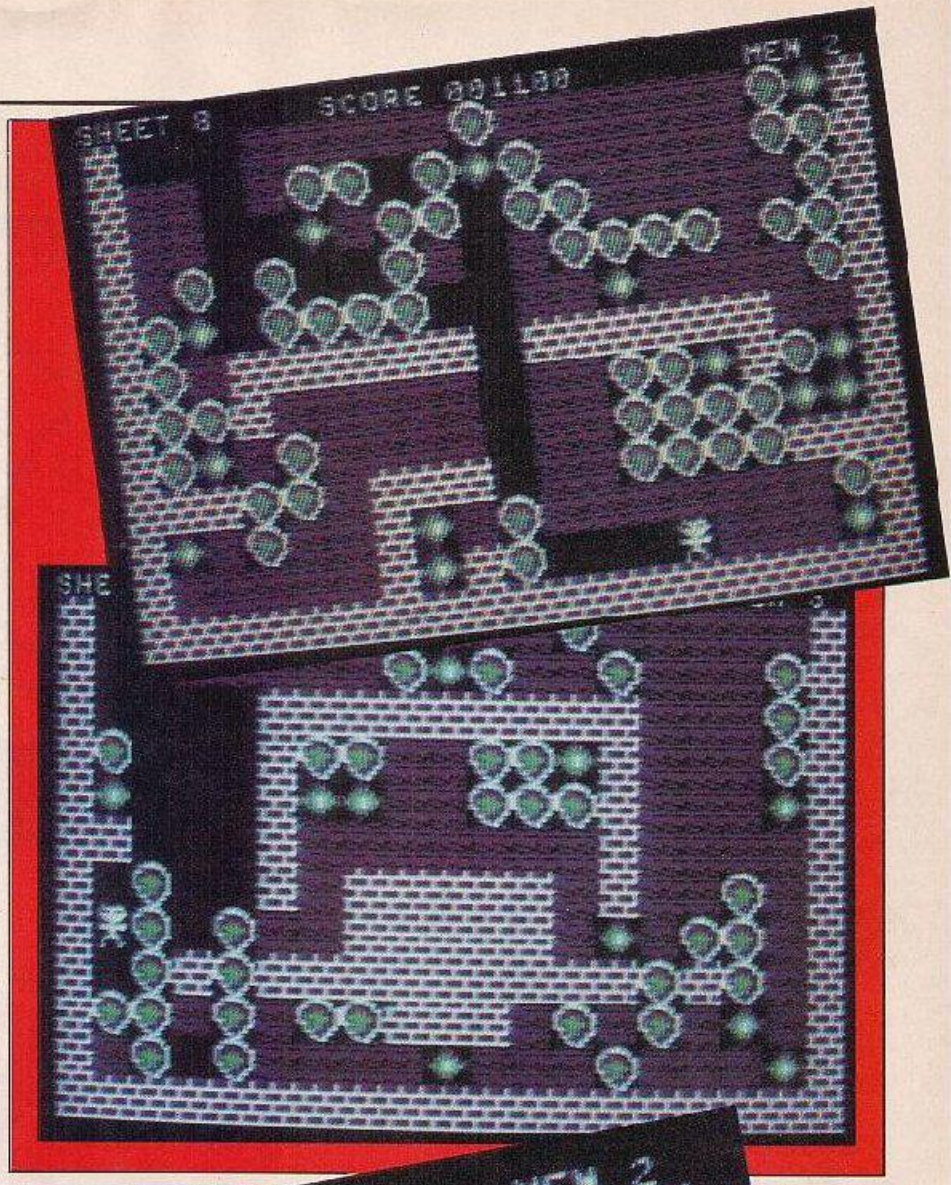
During the game you will probably find that you have dropped a rock and it has cut you off from one or more of the diamonds. If this happens press the F1 key to lose a life and the screen will be redrawn. On most of the screens the rocks are placed strategically so that under mining one could block you off or the diamonds off from each other, it could also unblock the way to a diamond.

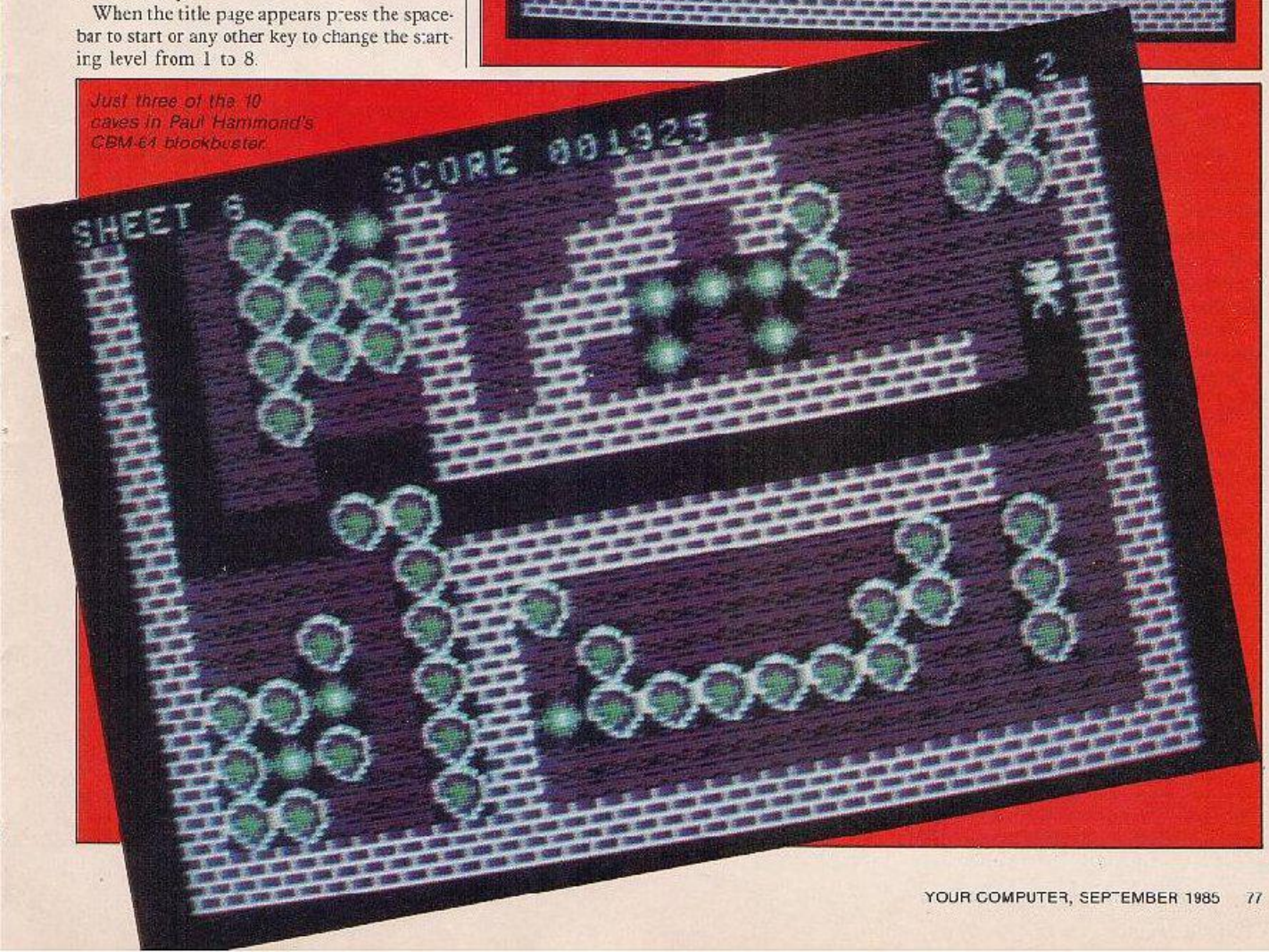
The game is keyboard only and the following keys should be used:

S = Up
X = Down
: = Left
; = Right
F1 = Die

To play the game type in the first program which sets up the machine code and graphics and save it. Next type in the Basic program and save it after the first. Now, when you press Shift and Run/Stop the game should load and run automatically.

When the title page appears press the spacebar to start or any other key to change the starting level from 1 to 8.

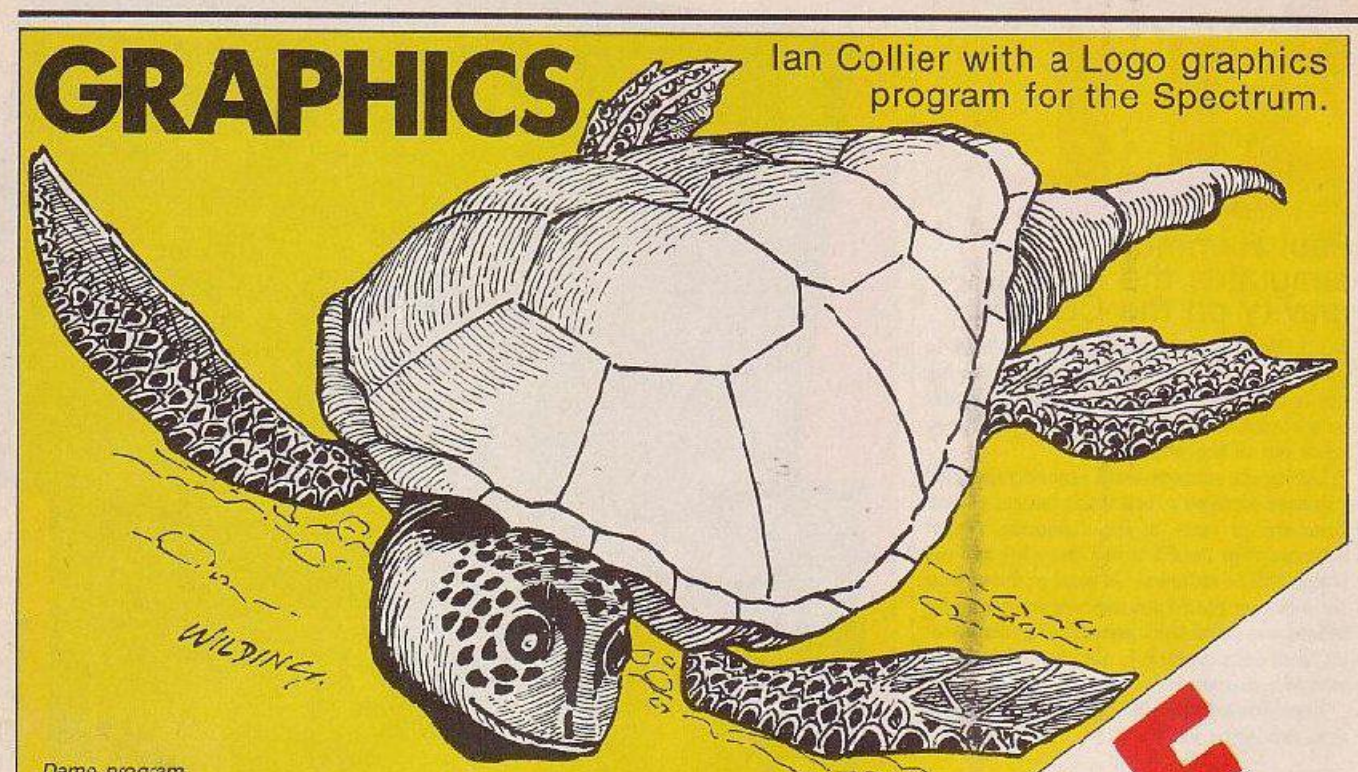




Just three of the 10 caves in Paul Hammond's CBM-64 blockbuster.

GRAPHICS TURTLE

Ian Collier with a Logo graphics program for the Spectrum.



Demo program.

```
 10 BORDER 0: PAPER 0: INK 7: C
LS : RANDOMIZE USR 30000
 20"d:r0:mov127,87:rep90:for45-
rep/2:rot30:end
 30"for44:rot90:for10:fil125,85
,4
 40 PAUSE 50:"scr2,0": PAUSE 50
:"scr0,2
 50".sta:rep5:fora:rot150:fora:
rot-78:end
 60 PAUSE 50: CLS
 70"box255 175:mov100,70:pol6,1
40,60
 80 LET a=20:"mov130,87:dir5:st
a:fil140,100,2
 90"bor2:ink4:cir60
 100 INPUT ""
 110"mov8,8:dir0:ink6:rep4:rep30
-10*(rep=1 OR rep=3):for4:num4:e
nd:rot90:end
```

On Telsoft.

THIS IS an implementation of the turtle graphics part of Logo, adapted into about 15 commands.

To set up the machine code the listing of data must be entered and run. The data will be read and Poked in by the Basic program.

After creating the graphics code it should be ready for use at 30000. It may, however, need to be moved, for example to a higher address in a 48K Spectrum. Having saved the code with:

Save "logo"CODE 30000,1000

the relocate program will move the code, first by loading it in at the new address, if this has not already been done, then changing the absolute addresses. A copy of the code at 30000 should be retained for the demonstration program.

Program 1 allows you to use the turtle graphics without writing a program. It incorporates one loop using the control variable a, which can be set up. Commands are as follows:

DIR x	— Points turtle in a direction x degrees anticlockwise from horizontal right.
CIR x	— Draws a circle around the turtle, radius x pixels.
BOX x,y	— Draws a box with two diagonally opposite corners at the turtle and (x,y).

Data loader.

```
 10 DEF FN d(a$)=CODE a$-48-(32
AND a$>"2")-(7 AND a$>"9"): DEF
FN h(a$)=FN d(a$+1)+*16+FN d(a$
(2))
 20 RESTORE : CLEAR 29999: LET
a=30000
 30 FOR x=100 TO 340 STEP 10
 40 READ a$: LET t=VAL a$( TO 4
): LET a$=a$(5 TO )
 50 POKE a,FN h(a$): LET t=t-PE
EK a: LET a=a+1
 60 LET a$=a$(3 TO ): IF a$<>""
THEN GO TO 50
 70 IF t THEN PRINT "Error in l
ine ";x: STOP
 80 PRINT "Line ";x;" OK": NEXT
x
 90 CLS : PRINT AT 10,10;"Finis
hed"
 100 DATA "67072a3d5c36dc233675d
f225f5c21d77ae52a535c2b1e22cdBA1
d384be7fe2e2819237ecdb618fe0d26e
bfe2220032318e4fe3a20ec23fe2e20e
7225d5c0603d1e7"
 110 DATA "6965cbaf12131049e7eb7
3237223e5cb7ecdb618fe0d28be23fe2
220f37efe3a28b4fe0d20ea18aee1360
021d675225d5ccdb2283817233600233
60023224a752336"
 120 DATA "5418002336002a5f52225
d5cc92a4b5ce500010800cd5516e3224
b5ce12336b22336652336f018ce52455
03a595d11cc75d53a3a5cfe0b2013cd1
876210313cd3025"
 130 DATA "7056200421cf12e5c3761
be13a3a5cfd3600ffcd3025280433c31
3132a5d5c225f5c225b5cc3bd12fd360
0ff2a3d5ce5e5ed733d5ce1cd3275e12
22d5cfdcb007ec0"
 140 DATA "670618c7df2b7efe22c28
a1c225d5ccd30252807cd4d0dfd3656f
8ef110677e50e03e7cbef4f1ab920061
310f5c11870e1225d5c131313131fd1
aa720e1e7fe2e20"
 150 DATA "57551ecd3025063a28020
622237ecdb618fe222807fe0d2803b82
0f0225d5c183dcd3025200c0603dffe0
dca8a1ce710f7182b:1d77ae50603cba
f4f1ab9200713e7"
 160 DATA "742910f5c1180fe1225d5
c13131310fd1aa720e2cf18eb4e23460
3cd407a1812e71ad5cdf67e1235e235
6ebcd3025c42c16cd541fd27b1bdffe0
dc8fe3aca4976fe"
 170 DATA "616622c28a1ce7c9a7c84
7c5cd821c4e2c2001e7c110f4c944495
2017c7043495201 9e78424f5802c8784
64f8201027942 4f5201942246494c036
67750 4f4c032379"
 180 DATA "5401494e4501f6794a554
d01fe79524f5401177a4d4f56022f7a5
04c4f02377a5343520251 7a524550016
f7a454e4400807a43414c013d7a3e10d
7cdd52dd7cd0723"
 190 DATA "704311010121fe00cd2d7
87cfe203051e60ffe033061cd667879 8
34fcd087828e7cb5c0af935f814f7a8
047cd0878280a79834fcd087820f818c
a21ff0079934fcd"
 200 DATA "8737087820 16cd2d787cf
e1038f0c5d5af92573047cd7377d1c11
8df79834f18a4c5e5d5af92573047cd7
```

Relocate program.

```
   1 DEF FN h(a$)=FN d(a$(1))*16
+FN d(a$(2)): DEF FN d(a$)=CODE
a$-48-(32 AND a$>"Z")-(7 AND a$>
"9")
   2 DEF FN a(a)=INT (a/256): DE
F FN b(a)=a-256*INT (a/256): DEF
 FN c(a)=PEEK a+256*PEEK (a+1)
   3 INPUT 'New address? ";a: CL
EAR a-1
   4 INPUT 'Original address? ";
f: LET t=PEEK 23730+256*PEEK 237
31+1
  10 RESTORE : DIM a(70)
  20 LET a=1
  30 FOR x=1 TO 3
  40 READ a$: LET tot=VAL a$( TO
 4): LET a$=a$(5 TO )
  50 LET 1=FN h(a$): LET h=FN h(
a$(3 TO 4))
  60 IF NOT 1 AND NOT h THEN GO
TO 80
  70 LET tot=tot-h-1: LET a(a)=h
*256+1-30000+t: LET a=a+1: LET a
$-a$(5 TO ): IF a$<>"" THEN GO T
O 50
  80 IF tot THEN PRINT "Error in
line ";90+10*x: STOP
  90 NEXT x
 100 DATA "5188347537753d759a75a
c75dd75e87525764b76a276ca76d276e
d760a7710771677 1c7728772e7734773
a77407746774c77"
 110 DATA "5728527758775a7764777
77785778b779b77a377b077b577c477d
877f177fa77067828783378507887789
9780679147924 79"
 120 DATA "568627795a797179817798
b799c79ae79bd79c379d279da79e079e
679e9790c7a247a2d7a4a7a737a8f7aa
97a527b00000000"
 135 LET a=t-f
 140 IF PEEK t=42 THEN GO TO 170
 150 PRINT 'Insert tape & press
a key": PAUSE 0
 155 CLS
 160 LOAD "logo"CODE t
 170 FOR x=3 TO 70
 180 LET c=FN c(a(x))+a: POKE a(
x),FN b(c): POKE a(x)+1,FN a(c)
 190 NEXT x
 200 LET a=a+PEEK (t+4)-256*PEEK
(t+7)
 210 POKE t+4,FN b(a): POKE t+7,
FN a(a)
```

Program 1.

```
  10 RANDOMIZE USR 30000
  20 PRINT AT 0,10;"code:";TAB 1
0;
  30 INPUT "Instruction >": LINE
 a$
  40 LET z=0: FOR x=1 TO LEN a$:
 LET a=a+1: IF a=4 THEN PRINT "
";
  50 IF a$(x)=":" THEN PRINT TAB
 10;: LET a=0: GO TO 70
  60 PRINT a$(x);
  70 NEXT x
  80 INPUT " FOR a=";x1;" TO ";x
2;" STEP ";x3
 140 CLS :"mov128,96:dr0
 145 LET xx=FN x()
 150 LET a=x1
 160"cal xx
 170 LET a=a+x3: IF a<=x2 THEN G
O TO 160
 180 GO TO 20
9500 BORDER 0: PAPER 0: INK 7: C
LEAR 29999: LOAD "logo"CODE : RU
N
9510 DEF FN x()=FN v(USR 31500,a
$): DEF FN y(v)=v
```

FOR x — Moves the turtle forward, leaving a trail.

BOR x — =BORDER x

FIL x,y,z — Fills in any enclosed area in ink z starting at (x,y). If filling starts at the edge of the area, then it is possible that only half will be filled, so aim for the middle.

POL x,y,z — Draws a polygon with x sides, moving first to (x,y) and going anticlockwise.

INK x — Any further drawing will be in ink x; this only lasts to the end of the line of instructions.

JUM x — Moves the turtle forward x pixels without changing the screen (Jump).

ROT x — Rotates the turtle x degrees anticlockwise.

MOV x,y — Moves the turtle to (x,y).

PLO, x,y — Moves the turtle to (x,y) and plots a pixel.

SCR x,y — Changes the screen colours to paper x and ink y without erasing the patterns.

REP x — Marks the start of a set of instructions to be repeated x times. Also sets up the Basic variable Rep which is equal to the counter of the innermost loop. Note Rep starts at x and goes down to 1.

END — Marks the end of the repeated instructions.

The instructions can be in upper or lower case.

The prompt Instructions will appear and the instructions must be typed in (I have printed out some examples). Then the prompt For a= will appear and you must set up the loop as in Basic by typing three numbers followed by Enter, e.g.

FOR a= 1 TO 50 STEP 1

If a loop is not required, three 1s can be entered.

If a mistake has been entered in the instructions, the program will stop with a report. Otherwise, the instructions will be carried out and you may then enter some more. Each time a set of instructions is entered, the screen is cleared and the turtle is moved to the centre of the screen and pointed horizontally right.

To use the commands in a program they must be initialised. If the code is still in its original position, this is done by:

RANDOMIZE USR 30000

The syntax checker will now accept the new commands, but to use the commands, they must be re-initialised if the program has been altered. This is so that the new position of the variables is recognised, and the new defined procedures are found. The commands need to be initialised after Clear and Run, as these reset the machine stack. If Interface 1 is connected, this adds complications.

The new commands are regarded by the program as syntax errors unless followed by a turtle graphics command, but they work within a program. Also, when one of the new error reports — e.g. Microdrive not present — is caused, this resets the machine stack and the graphics commands need to be re-initialised.

To enter the new commands, they must be placed inside quotes, but at the end of a line, the final quotes may be omitted. For use in a program, there is one more command — Cal.

It calls instructions at the address given. If these instructions are in a string, the address of the instructions needs to be found and the string needs to be prepared by inserting the hidden floating point forms after the numbers — these will not be hidden in a string and will appear as question marks and other characters. This is done by the routine at 31500 and is demonstrated in program one in lines 145,9510.

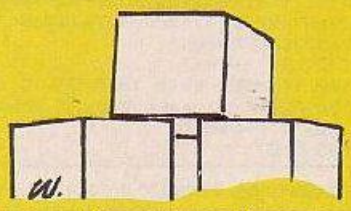
New commands are like definable procedures. For an example see the command sta in the demo program. To define a procedure, open quotes as usual and type a full stop followed by the three-letter name, then a colon. The commands following this will be executed every time the new command is encountered. The end of the defined command is at the first close quotes encountered in the definition, or at the end of the line. ■

```
377c1e1c17ce60f67cb85188ec5e5d57
88247af935f814f"
 210 DATA "8383cd08787b20f821fe0
0cd7377d1e1c17ce6f067cbcdc373777
93c281b3d281878a72814feaf2810e5c
5cdea2247047e0710fde601c1e1c9cd6
678af3cc9c5c578"
 220 DATA "91828247cd0878f7f5adc
b4f280124e6fd6ff1b56f87f6fba56fd
1c1c5d5789247cd0878f5adcb472804 7
cc610677de6fe6ff1b56fd1c1c9c5d5e
5cdea2247043e01"
 230 DATA "67930f10fdb677cddb0be
1d1c1c9efa3043440b0005a053811b97
acdc033ef3120011f020230010a00eb1
1be7aedb0c93a7d5ccd282def01383a7
e5ccd282def0138"
 240 DATA "74982a7d5ce53a8f5cf5c
d2d23f1328f5ce1227d5cfd3656f8c7e
fc102383a7d5ccd282def03e1383a7e5
ccd282def0338cd0723c50600cdba24c
1c50e00cdba24c1"
 250 DATA "7596c5af5257af935f060
0cdba24c10e00c3ba24ef3:3821be7ac
dc033ed53655ce f04013821c37acdc03
3ed53655cef0438c3b72421b97a11c87
a010f00edb0efc4"
 260 DATA "638302c502382a7d5ce57
ccd282de17dcd282defc3342c0003e50
301e403010524e3e50337a3a30f040f3
811b97acdc033efe5e438cd0723c5ef3
120011f02023 8eb"
 270 DATA "698411be7a010a00edb0c
12a7d5c7d91c5e5dcf179cd282de1c17
c90dcf179cd282def3104013104 0f280
238eb11af7acdc033ef31a3010531 0f3
10f0233eb11b47a"
 280 DATA "8030ccc033cdd52d47c5e
f3138eb21af7acdc033cd0279ef31313
8010a00a7ebed42ef21b47aedb0ef0f3
811b97acdc033cd8c78c110d221c87a1
1b97a010f00edb0"
 290 DATA "8672c92f3c2effc93e10d
7cdc52dd7c9fd3656ff21915c7ef5cbc
6cbc6cd0279f132915cfd3656f8c9efa
3043440b0005a053138eb21b97acdc03
3ef0f38c3b678cd"
 300 DATA "74730723ed437d5cc9cd0
723c3e522cda22d2a5d5ce50bed435d5
ccd4976e1225d5cc93e10d7cdd52dd73
e11d7cdd52dd73a8f5c210058110158 0
1bf0277edb0c9cd"
 310 DATA "9265d52d2ada75772a5d5
ce3f51:841dc5e9e1c178fe1d2804c5e
5cf00f:3ded5bda75122809d1d5f5c5e
d535d5ce9d1c17afe1d2009f1f5d5ed5
bda7512e9d5e985"
 320 DATA "50813b46736a81060a91c
1377bad2dbd807c1c5aed7e31d0f5498
77bad2dbd307c1c5aed7e31d0f549414
1410e5d0000000000000000000000000
00000000000000"
 330 DATA "3537000000000000000
0000000000000000000000000000000
0000000e7cdb228da2e1c235e2356e51
77e23232225f5c2bfe0d2806cd32:6233
62de1e5237efe22"
 340 DATA "72072806cd5216233622e
1e523cda7112a5d5c225b5ce1e5225d5
cfdcb30a6fdcb0lbecd49762a5b5c225
d5cfdcb01fe2a5f5c2b2bd1a7ed52eb4
44d722b7303c900"
```

BASIC

Geoff Hatto with a routine to help in the development of a program by storing and executing individual lines of Basic text from within a standard editor. For the CBM-64.

This program is available on Telsoft.



THIS PROGRAM allows individual Basic macros — lines of Basic text — to be stored and executed from within the standard editor. This means that you can define simple one line Basic routines to help in the development of a program. The macros are themselves completely separate from the main program under development.

They are stored in a different area of memory and can be defined, listed, edited and executed using a special set of simple commands. The program also supports an Old command and has two further commancs for disc drive owners, a screen directory and command string utility.

The program has been designed to be easy to use and has full error-checking facilities in addition to the standard error routines. The extensions are in the form of single character commands, and all the standard Basic abbreviations are left intact — i.e. L shift, I for List etc.

Up to 10 macros can be defined at any time. Each one can access the main program with a Run or Goto/Gosub statement, but a macro cannot be called from within another macro. Macros only work in direct mode, and therefore cannot be accessed by the main program. Also, the Input and Get commands cannot be included in a macro because they are not direct mode statements.

To define a macro, the letter M is typed followed by the desired macro number — 0 to 9. This is then followed by the Basic text as though you were typing in a standard line in Basic. When return is finally entered, the line is stored in memory ready to be executed.

To run the macro, the letter M is again typed followed by the macro number, but this time with no following text. The macros can then be run — or redefined — as many times as required. To list a macro, the letter L is typed followed by the desired macro number.

After hitting return the macro is listed to the screen preceeded by an M and the macro number. This allows you to directly screen edit the listed macro.

When using Macro 0, the macro number 0 itself need not be specified. Typing M is therefore equivalent to M0. When defining macro 0 like this, a space must be left between the M and the text, otherwise a syntax error will result.

If you execute a macro which causes an error, a message will appear, displaying the error and the macro number. If the error occured in the main program which was called from a macro, then the error will be reported togetyher with the current macro number. Programs executed in the normal way produce standard error messages.

Because this program has been designed as a program development aid, it is relatively crash resistant. Hitting the Run/Stop and Restore keys together have no effect on the extensions and the program can still recover the macro definitions even after a complete power reset — cold start SYS64738 or shorting pins 1 and 3 on the user port — with care! Just type

SYS49152

```
10 REM  ****************************
20 REM  **                        **
30 REM  **  MACRO EDITOR EXTENSION **
40 REM  **  (LOADER)   6.HATTO '85 **
50 REM  **                        **
60 REM  ****************************
70 :
80 READ ADDRESS
90 :
100 BEGIN = ADDRESS
110 MAXNUMBER = 196
120 :
130 DEF FN LINENUMBER(A) = PEEK(63)*PEEK(64)*256
140 :
150 PRINT"[CLR] LOADING CODE INTO RAM  PLEASE WAIT."
160 PRINT
170 FOR COUNT=1 TO MAXNUMBER:GOSUB 400 (* READ 8 DATA
    LINE *) :READ CHECKSUM
180 IF SUM<>CHECKSUM THEN PRINT"CHECKSUM ERROR IN ";FN
    LINENUMBER(0):END
190 L = FN LINENUMBER(0):PRINT L
200 IF ADDRESS<>L+8 THEN PRINT"LINE NUMBER";L;" NOT
    IN ORDER":END
210 NEXT COUNT
220 :
230 :
240 REM SAVE CODE TO DEVICE
250 :
260 REM DEVICE TAPE=1 DISK=8
270 DEVICE = 1
280 :
290 S$ S7912"EDITOR EXTENSION",DEVICE,1
300 :
310 POKE252,BEGIN-INT(BEGIN/256)*256
320 POKE253,INT(BEGIN/256)
330 POKE780,252
340 POKE781,ADDRESS-INT(ADDRESS/256)*256
350 POKE782,INT(ADDRESS/256)
360 :
370 S"S65496:S"S49152:END :(* RUN EDITOR *)
380 :
390 :
400 SUM = 0
410 FOR I=1 TO 8:READ ENTRY$
420 GOSUB 480 (* CONVERT HEX BYTE *)
430 POKE ADDRESS,ENTRY
440 ADDRESS = ADDRESS+1 SUM = SUM+ENTRY
450 NEXT I
460 RETURN
470 :
480 IF LEN(ENTRY$)<2 THEN 570
490 A1 = RIGHT$(ENTRY$,1):GOSUB 530:ENTRY = V
500 A1 = LEFT$(ENTRY$,1):GOSUB 530:ENTRY = ENTRY*16
510 RETURN
520 :
530 IF A1<"0" OR A1>"F" OR (A1>"9" AND A1<"A") THEN 570
540 V = ASC(A1)-48+7*(A1>"9")
550 RETURN
560 :
570 PRINT"DATA ERROR IN ";FN LINENUMBER(0):END
580 :
590 DATA 49152
600 :
49152 DATA A9,50,A2,C1,8D,02,03,8E,900
49160 DATA 03,03,A9,4B,A0,C1,20,04,735
49168 DATA C1,20,21,C0,20,D0,C0,A9,1051
49176 DATA C0,20,90,FF,30,20,EC,C3,1139
49184 DATA 60,A9,00,20,90,FF,A9,03,873
49192 DATA 8D,B7,C0,20,96,C0,90,15,1056
49200 DATA EE,B7,C0,AD,B7,C0,C9,13,1378
49208 DATA D0,F1,A9,4A,A0,C0,20,04,1016
49216 DATA C1,A9,08,8D,B7,C0,20,B3,1105
49224 DATA C0,60,8D,20,20,4E,4F,20,554
49232 DATA 44,49,53,4B,20,44,45,56,554
49240 DATA 49,43,45,20,46,4F,55,4E,553
49248 DATA 44,20,4F,4E,20,53,45,52,523
49256 DATA 49,41,4C,20,42,55,53,0D,493
49264 DATA 00,0D,20,20,44,49,53,43,376
49272 DATA 20,53,55,50,50,4F,52,54,605
49280 DATA 20,41,55,54,4F,2D,53,45,542
49288 DATA 54,20,54,4F,20,44,45,56,534
49296 DATA 49,43,45,20,23,68,A9,0F,468
49304 DATA AE,B7,C0,A0,0F,20,BA,FF,1197
49312 DATA A9,03,A2,38,A0,C0,20,BD,1091
49320 DATA FF,20,C0,FF,86,F9,0F,20,958
49328 DATA C3,FF,20,CC,FF,20,63,08,1085
49336 DATA 55,49,2B,A9,71,F0,C3,20,867
49344 DATA 04,C1,9E,37,C8,F9,03,20,947
49352 DATA CD,BD,99,0D,20,12,FF,60,1169
49360 DATA AD,1B,C6,D0,16,EE,1B,C6,1091
49368 DATA A9,09,8D,1C,C6,EE,1B,C6,1008
49376 DATA 20,7A,C3,20,A6,C3,CE,1C,976
49384 DATA C6,10,F5,60,98,EB,A3,1A,905
49392 DATA A2,C1,8D,00,03,8E,01,03,645
49400 DATA 60,A9,3B,A2,E3,8D,03,03,937
49408 DATA 8E,01,33,60,85,35,84,36,614
49416 DATA A0,00,B1,35,F0,EB,20,D2,883
49424 DATA FF,E6,35,D0,F3,E6,36,D0,1481
49432 DATA EF,60,BA,30,0F,AD,1C,C6,935
49440 DATA 10,0A,A9,2F,A0,C1,20,04,631
49448 DATA C1,20,41,C1,4C,EB,E3,0D,938
49456 DATA 3F,45,52,52,4F,52,20,49,562
49464 DATA 4E,20,4D,41,43,52,4F,20,512
49472 DATA 00,40,D0,40,AD,4C,C6,29,782
49480 DATA 7F,AA,A9,00,20,CD,BD,A9,1061
49488 DATA 20,20,D2,FF,68,FA,68,60,1003
49496 DATA A9,00,8D,1C,C6,20,68,A5,829
49504 DATA 86,7A,34,7B,20,73,00,AA,820
49512 DATA F0,EE,38,A2,00,20,79,00,801
49520 DATA D0,99,C1,D0,0E,C9,43,F0,1294
49528 DATA 10,A0,31,31,7A,F0,8D,C9,933
49536 DATA 3B,90,39,E8,E0,06,D3,E5,1111
49544 DATA 28,4C,90,A4,28,BD,9F,C1,1005
49552 DATA 48,BD,A5,C1,48,20,73,00,838
49560 DATA 60,4F,4D,4C,40,24,51,C4,705
49568 DATA C2,C3,C4,C4,C5,14,F4,B0,1424
49576 DATA 6B,C3,E9,93,0D,20,23,42,825
49584 DATA 41,53,49,43,20,4D,41,43,529
49592 DATA 52,4F,20,45,44,49,54,4F,566
49600 DATA 52,20,45,58,54,45,4E,53,585
49608 DATA 49,4F,4E,20,20,47,43,27,476
49616 DATA 38,35,8D,20,20,2D,2D,2D,321
49624 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49632 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49640 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49648 DATA 2D,2D,2D,2D,2D,2D,2D,2D,360
49656 DATA 0D,0D,20,20,45,44,49,54,384
49664 DATA 4F,52,20,43,4F,4D,4D,41,550
49672 DATA 4E,44,53,20,4E,4F,57,20,537
49680 DATA 41,56,41,49,4C,41,42,4C,572
49688 DATA 45,3A,2D,0D,0D,20,23,20,294
49696 DATA 20,20,4F,20,2E,2E,2E,2E,359
49704 DATA 2E,2E,2E,2E,2E,2E,23,4F,387
49712 DATA 4C,44,3D,20,20,20,23,20,327
49720 DATA 4D,20,58,2E,54,45,53,54,560
49728 DATA 2E,2E,2E,2E,20,44,45,46,423
49736 DATA 49,4E,45,20,42,41,53,49,539
```

MACRO EDITOR

to recover extensions.

The macro definitions are located in the $C000 block — as is the program — which has no effect on Basic. The macros are actually executed in this block and the only way to corrupt them is to poke into this area.

Typing the letter O followed by return runs an Old command. This recovers Basic text from the current start of Basic. The text can then be treated in the normal way. This is useful after a complete power reset or after typing New. This command, and typing New, have no effect on the macro definitions.

For disc owners, DOS support is provided. When the program is initialised, it scans the serial bus for a disc drive and assigns a matching device number to the program. If no drive is found, a device #8 is assumed — in case you've left the disc drive off! Command strings are sent preceded by the symbol @. Typing just the symbol @ followed by Return displays the current disc error channel. The demonstration disc provided with the drive contains something similar to this.

A screen directory is provided using an $ command which lists the directory contents to the screen instead of the memory, it also shows the number of displayed files listed to the screen.

The command can be issued in the form of a string, i.e.

$:L* =SEQ

would display all files beginning with L that are sequential. See disc drive operating manual for more details on command strings.

The program does not affect the speed of Basic program operation, as it is only active in direct mode. Should you require to load yet another one of the many programs that seem to end up in $C000 then the Q command is provided which turns off the extensions. If you do this by mistake the macros will still be in memory — just re-enter the program.

To get a copy of this program on tape or disc — change line 270 as appropriate — type in the program listed and save it. Now place a blank cassette in the cassette deck or disc in the disc drive and type Run. If all is well, then the program will have saved an executeable copy of the program on tape — or disc. If not, then the reported errors in the Data statements must be corrected and the listing re-saved ready for another attempt.

The program may be reloaded and run when required by typing:

LOAD"EDITOR EXTENSION",1,1 for tape,
LOAD "EDITOR EXTENSION",8,1 for disc,
Execute with

SYS49152

followed by Return. Type New if no Basic program exists, or use the Old command — the letter O and Return — to recover any resident program.

To finish with, here are a few examples of macro definitions to show you how they can be used.

M LIST 2300 — 2450

lists the current set of lines of interest when developing a section of program, in this case from 2300 to 2450.

M1 CLR:PRINT FRE(0)—(FRE(0)<0)*65536;" BYTES FREE."

prints the correct number of free bytes available for a program.

M2 F$="PROGRAMNAME"+STR$(PEEK(252)):
SAVE F$,1:POKE252,(peek(252)+1)AND255

saves the current Basic program called "Programname" to tape with an updated version number. Location 252 contains the current version number.

M3 GOSUB 10: PRINT"VARIABLE 'A' SET TO ";A

If the End statement in the main program is replaced with a Return statement then the whole program can be treated as a subroutine by a macro, in this case displaying the final value of a variable A when the main program starting at line 10 has ended.

M4 OPEN4,4:CMD4:LIST
M5 PRINT # 4:CLOSE4

These two definitions when executed can be used to print a program to a Commodore printer, the second one is used after the printer has stopped, to close the printer channel. ■

```
49744 DATA 43,20,4D,41,43,52,4F,0D,482
49752 DATA 20,20,20,20,23,4D,20,58,357
49760 DATA 2E,2E,2E,2E,2E,2E,2E,2E,063
49768 DATA 2E,20,45,58,45,43,55,54,543
49776 DATA 45,20,4D,41,43,52,4F,0D,484
49784 DATA 20,20,20,20,23,4C,20,58,355
49792 DATA 2E,2E,2E,2E,2E,2E,2E,2E,363
49800 DATA 2E,20,4C,49,53,54,20,4D,503
49808 DATA 41,43,52,4F,0D,20,20,20,402
49816 DATA 20,20,40,23,53,5[illegible],52,49,402
49824 DATA 4E,47,2E,2E,2E,2E,20,44,433
49832 DATA 49,53,4B,20,43,4F,4D,4D,563
49840 DATA 41,4E,44,53,0D,20,2E,20,403
49848 DATA 20,20,24,23,53,54,52,49,454
49856 DATA 4E,47,2E,2E,2E,2E,20,44,433
49864 DATA 49,52,45,43,54,4F,52,59,625
49872 DATA 0D,20,20,23,20,20,51,20,206
49880 DATA 2E,2E,2E,2E,2E,2E,2E,2E,368
49888 DATA 2E,2E,20,51,55,49,54,0D,460
49896 DATA 0D,00,20,79,00,B0,07,20,381
49904 DATA F3,BC,20,A9,B1,60,A2,0B,1079
49912 DATA 4C,3A,F4,03,A2,00,8E,1C,638
49920 DATA C6,20,F0,32,B0,10,C9,30,969
49928 DATA 90,51,29,0F,0D,1C,C6,20,600
49936 DATA 73,00,F0,1E,90,45,A0,04,762
49944 DATA A6,7A,20,79,A5,20,7F,C9,955
49952 DATA B9,00,82,91,35,F0,05,C8,830
49960 DATA C0,FC,98,F4,23,A6,C5,4C,1381
49968 DATA 74,A4,AD,1C,C6,20,A5,00,892
49976 DATA 09,80,8D,1C,C6,A9,BE,85,934
49984 DATA 9D,A9,FF,85,9A,20,7F,C9,1121
49992 DATA 38,A5,35,E9,01,85,7F,A5,928
50000 DATA 36,E9,00,85,73,20,E1,A7,967
50008 DATA 4C,74,A4,A9,67,A0,C5,20,1015
50016 DATA 04,C1,F2,0E,4C,1A,C1,0D,681
50024 DATA 3F,4D,41,43,52,4F,20,44,533
50032 DATA 45,46,49,4E,49,54,49,4F,599
50040 DATA 4C,00,C0,00,03,35,05,36,620
50048 DATA AD,1C,C6,29,7F,A8,F6,10,991
50056 DATA 18,A5,35,69,53,85,35,A5,779
50064 DATA 36,69,00,85,36,88,D6,F0,930
50072 DATA 18,A9,1D,65,35,85,35,A9,731
50080 DATA C6,65,36,85,36,68,A9,00,805
50088 DATA A2,04,31,35,C0,CA,D0,FA,1224
50096 DATA 60,00,A2,03,8E,1C,C6,20,674
50104 DATA F0,10,E0,53,C9,30,9E,4C,981
50112 DATA 29,0F,ED,1C,C6,20,73,00,570
50120 DATA D0,45,A9,F3,A0,C3,20,04,1005
50128 DATA C1,20,41,C1,A9,08,AE,C4,1016
50136 DATA 20,04,C1,23,41,C1,A5,01,689
50144 DATA 85,0F,F0,00,84,49,84,14,665
50152 DATA 84,15,20,7A,C3,A5,35,A6,886
50160 DATA 36,85,5F,86,60,4C,82,A7,758
50168 DATA 0D,4D,41,43,52,4F,20,4C,491
50176 DATA 49,53,54,49,4E,47,2E,00,494
50184 DATA 0D,0D,4D,00,A9,01,2C,A9,496
50192 DATA 0E,AA,4C,1A,C1,A6,2C,A5,854
50200 DATA 2D,05,2D,06,2C,D0,0E,C6,809
50208 DATA 2E,C6,2D,A9,02,A0,02,91,767
50216 DATA 2D,20,4E,C4,A3,00,20,54,627
50224 DATA C4,B1,2D,D0,F7,C8,B1,2D,1295
50232 DATA D0,EF,C8,B1,2D,D0,EF,20,1343
50240 DATA 51,C4,20,54,C4,20,33,A5,837
50248 DATA 20,59,A6,4C,74,A4,20,51,756
50256 DATA C4,20,C4,C4,E5,2D,D0,02,993
50264 DATA E6,2E,A5,2E,C5,38,D0,04,952
50272 DATA A5,2D,C5,37,B3,01,66,A2,897
50280 DATA 10,4C,37,A4,F3,22,48,AD,838
50288 DATA 37,C0,20,B1,FF,A9,6F,20,1151
50296 DATA 93,FF,A9,60,85,7C,68,20,1050
50304 DATA A8,FF,20,73,03,C9,00,D0,979
50312 DATA F6,20,AE,FF,A9,C9,85,7C,1334
50320 DATA 20,9E,C4,D0,03,4C,74,A4,953
50328 DATA 20,CC,FF,4C,74,A4,A9,00,1016
50336 DATA 85,90,AD,B7,C3,20,B4,FF,1292
50344 DATA 20,B7,FF,D0,15,A9,6F,20,1012
50352 DATA 96,FF,20,A5,FF,24,90,70,1149
50360 DATA 05,20,D2,FF,D3,F4,20,AB,1157
50368 DATA FF,A9,00,60,A5,7A,C6,86,1144
50376 DATA 3B,A6,7B,86,BC,C9,00,F0,1239
50384 DATA 07,20,73,00,C9,00,D0,F5,812
50392 DATA 38,A9,FE,85,9E,A5,7A,E5,1286
50400 DATA EB,85,B7,A9,01,AE,B7,C0,1234
50408 DATA F0,08,23,BA,FF,A5,B7,A6,1147
50416 DATA EB,A4,BC,20,BD,FF,20,C0,1239
50424 DATA FF,B0,57,A2,01,20,C6,FF,1178
50432 DATA E0,58,20,CF,FF,20,CF,FF,1244
50440 DATA 20,CC,FF,A9,D1,A0,C5,20,1226
50448 DATA E4,C1,A5,D6,C9,10,D0,05,1014
50456 DATA 6D,0D,02,F0,07,20,5D,C5,805
50464 DATA 65,90,D0,08,20,E1,FF,D0,1245
50472 DATA E9,E6,9E,18,A9,0D,20,C3,1054
50480 DATA FF,20,CC,FF,A9,C6,A0,C5,1478
50488 DATA 20,04,C1,A6,9E,E0,C8,90,1121
50496 DATA 62,A2,00,A9,00,20,CD,BD,759
50504 DATA A9,D5,A0,C5,20,04,C1,4C,1044
50512 DATA 74,A4,48,A9,01,20,C3,FF,1016
50520 DATA 68,38,4C,F9,E0,A2,0D,20,916
50528 DATA C6,FF,20,A3,C5,20,A3,C5,1237
50536 DATA E6,9E,A9,20,20,D2,FF,20,1118
50544 DATA D2,FF,20,D2,FF,20,D2,FF,1459
50552 DATA 20,A3,C5,B5,63,20,A3,C5,1016
50560 DATA B5,62,20,D1,BD,A5,20,20,894
50568 DATA D2,FF,20,A3,C5,A2,01,86,1154
50576 DATA D4,C9,00,F3,06,20,D2,FF,1156
50584 DATA 4C,8A,C5,23,CC,FF,A9,0D,1084
50592 DATA 4C,D2,FF,23,CF,FF,A6,90,1345
50600 DATA D0,81,60,63,68,18,4C,2C,657
50608 DATA C5,8D,20,23,55,53,45,20,543
50616 DATA 53,48,49,45,54,20,4B,45,558
50624 DATA 59,20,2D,0D,0D,00,0D,20,237
50632 DATA 20,20,20,54,4F,54,41,4C,484
50640 DATA 20,4F,46,23,00,20,46,49,388
50648 DATA 4C,45,28,53,29,20,44,49,482
50656 DATA 53,50,4C,41,59,45,44,2E,576
50664 DATA 0D,00,A9,83,A2,A4,8D,02,782
50672 DATA 03,8E,03,03,18,20,EC,C0,635
50680 DATA A9,02,A0,C5,20,04,C1,4C,834
50688 DATA 74,A4,0D,45,44,49,54,4F,666
50696 DATA 52,20,45,53,54,45,4E,53,585
50704 DATA 49,4F,4E,53,20,4F,46,46,564
50712 DATA 2E,0D,00,03,00,00,00,00,59
```

TIME BO

Join the bomb disposal squad with Chris Turner's Amstrad game.

TIME BOMB will run on an Amstrad CPC-464 in about 9K. The object of the game is to help the hero, Arnold the Anarchist, find his bombs before they blow him up. You can move Arnold up, down, left or right a square at a time, obliterating the square which he has just left or you can slide him left or right, moving the row he is on with him and preserving the underlying square. All this becomes obvious when playing the game.

The time left before the bomb explodes is shown as a burning fuse at the bottom of the screen. If a bomb explodes or if he touches one of the skulls which are spread liberally around the screen, Arnold loses a life. If, however, he completes a sheet, Arnold goes on to the bonus stage. Here you must press the key down when he is above the bomb. If Arnold lands on the bomb bonus points are gained.

There should be no problems typing in the program as there are no long Hex dumps. There are about 160 bytes of machine code, but these are in nice friendly Data statement. These lie between lines 9300 and 9470 and should be very carefully typed in if the code is to work. Also you should bear in mind that Call commands are nasty fellows if the necessary machine code is not there. It may be a good idea to leave the Calls out till the end of your typing, and under no circumstances run a part of the program with a Call in it without first correctly entering and running the program between lines 9300 and 9470. When all has been typed in the program can be saved by just typing in:

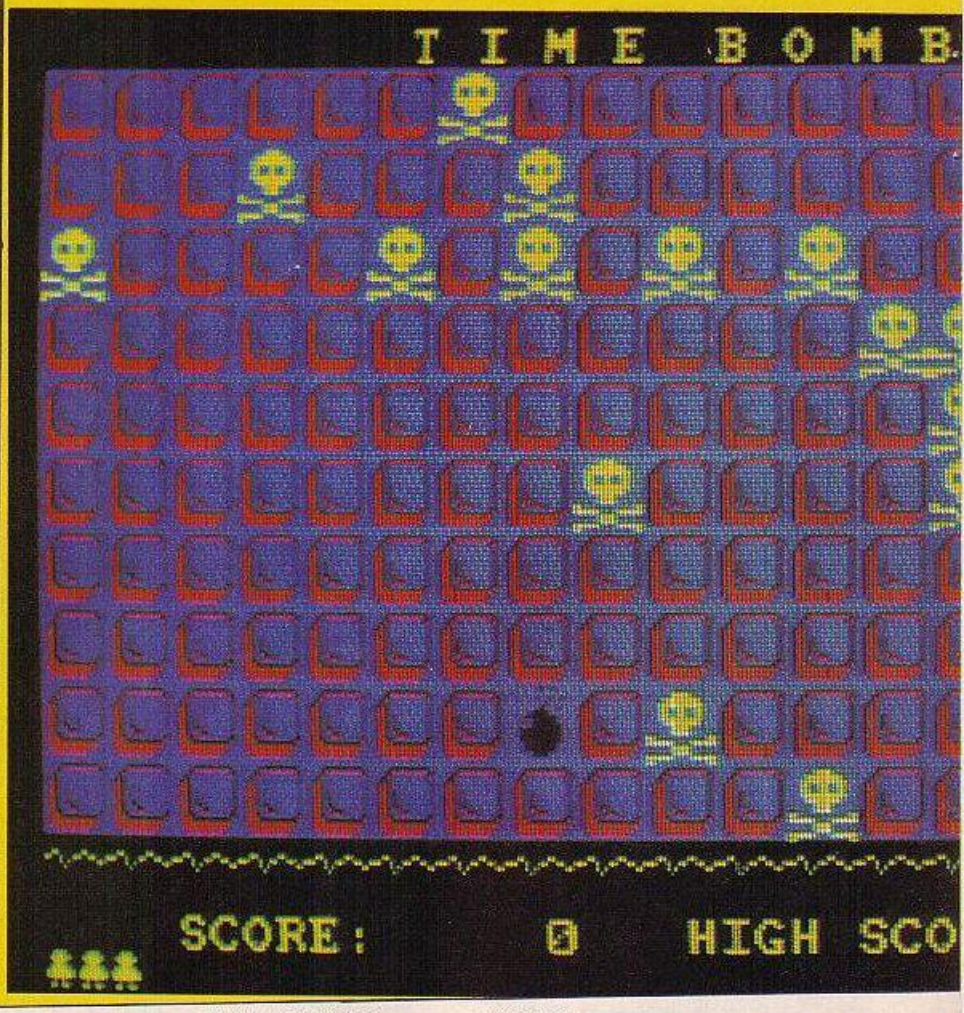
SAVE"TIME BOMB"

It's a good idea to Cat it just to be sure all is well. The game can now be loaded and run in the normal way.

If you are interested, the machine code is called by the command:

CALL &9000,

followed by the address of first byte of first line to be scrolled, 1 for left or 2 for right.




```
5 REM
10 REM        T I M E   B O M B
15 REM          by C.Turner
20 REM       for Your Computer
25 REM
30 REM
35 REM                  ''
40 REM
45 REM
50 REM
55 REM
80 REM *initialise*
90 GOSUB 9000
100 GOSUB 5000:GOSUB 7000
110 ds=0:GOSUB 1000:IF ds=1 THEN 150
120 ds=0:GOSUB 3000:IF ds=1 THEN 150
130 GOTO 110
150 GOSUB 4000
155 IF sc>hi THEN hi=sc:LOCATE 11,24:PRINT USING"####
#";hi
160 GOTO 100
1000 REM *move man*
1010 i=JOY(0)
1050 IF INKEY(69)=-1 AND j<20 THEN 1060
1051 b$(mv)=RIGHT$(b$(mv),19)+LEFT$(b$(mv),1)
1052 FOR i=1 TO 2
1053 CALL &9000,49152+160*(mv),1
1054 CALL &9000,49152+mx+160*(mv+1),1
1055 NEXT
1056 mx=mx-1:IF mx=0 THEN mx=20
1057 IF mv=hv THEN bx=bx-1:IF bx=0 THEN bx=20
1058 ft=ft+1
1059 GOTO 1
1060 IF INKEY(62)=-1 AND j<24 THEN 1070
1061 b$(mv)=RIGHT$(b$(mv),1)+LEFT$(b$(mv),19)
1062 FOR i=1 TO 2
1063 CALL &9000,49152+160*(mv),2
1064 CALL &9000,49152+mx+160*(mv+1),2
1065 NEXT
1066 mx=mx+1:IF mx=21 THEN mx=1
1067 IF mv=hv THEN bx=bx+1:IF bx=21 THEN bx=1
1068 ft=ft+1
1069 RETURN
1070 IF INKEY(73)=-1 AND j<4 THEN 1080
1071 IF MID$(b$(mv),mx-1-20*(mx-1),1)=" " THEN RETURN
1072 LOCATE#1,2*mx-1,2*mv-1:PRINT#1," "LOCATE#1,2*m
x-1,2*mv:PRINT#1," "
1073 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-m
x)
1074 mv=mv-1:IF mv=0 THEN mv=20
1075 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(20
1);LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1076 sc=sc+10:LOCATE 11,24:PRINT USING"####";sc
1077 j=j+3
1078 GOTO 1200
1080 IF INKEY(63)=-1 AND j<8 THEN 1090
1081 IF MID$(b$(mv),mx+1+20*(mx=20),1)=" " THEN RETURN
1082 LOCATE#1,2*mx-1,2*mv-1:PRINT#1," "LOCATE#1,2*m
x-1,2*mv:PRINT#1," ";
1083 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-m
x)
1084 mx=mx+1:IF mx=21 THEN mx=1
1085 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(20
1);LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1086 sc=sc+10:LOCATE 11,24:PRINT USING"####";sc
1087 ft=ft+3
1088 GOTO 1200
1090 IF INKEY(8)=-1 AND j<1 THEN 1100
1091 IF MID$(b$(mv),mx+10*(mx=11),1)=" " THEN RETURN
1092 LOCATE#1,2*mx-1,2*mv-1:PRINT#1," "LOCATE#1,2*m
x-1,2*mv:PRINT#1," ";
1093 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-m
x)
1094 mv=mv+1:IF mv=11 THEN mv=1
1095 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(20
1);LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1096 sc=sc+10:LOCATE 11,24:PRINT USING"####";sc
1097 ft=ft+3
1098 GOTO 1200
1100 IF INKEY(22)=-1 AND j>2 THEN 1110
1101 IF MID$(b$(mv-1+10*(mv=10)),mx,1)=" " THEN RETURN
1102 LOCATE#1,2*mx-1,2*mv-1:PRINT#1," "LOCATE#1,2*m
x-1,2*mv:PRINT#1," ";
1103 b$(mv)=LEFT$(b$(mv),mx-1)+" "+RIGHT$(b$(mv),20-m
x)
1104 mv=mv-1:IF mv=1 THEN mv=1
1105 LOCATE#1,2*mx-1,2*mv-1:PRINT#1,CHR$(200);CHR$(20
1);LOCATE#1,2*mx-1,2*mv:PRINT#1,CHR$(202);CHR$(203);
1106 sc=sc+10:LOCATE 11,24:PRINT USING"####";sc
1107 ft=ft+3
1108 GOTO 1200
1110 REM
1200 REM *move checks*
1210 a$=MID$(b$(mv),mx,1)
1220 IF a$="*" THEN GOTO 2000
1225 IF a$="s" THEN GOTO 2500
1230 RETURN
2000 REM *dead*
2005 SOUND 2,800,2,15,1,1
2010 ll=ll-1
2020 IF ll=-1 THEN de=1:RETURN
2030 LOCATE 1,25:PRINT STRING$(11,216);" "
2032 WHILE SQ(2)<>4:WEND
2035 PEN#1,1
2040 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(208);CHR$(209
);LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(210);CHR$(211);
2045 PEN#1,2
2050 mx=20:mv=6
2055 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(201
);LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
2060 RETURN
2500 REM *defused*
2505 SOUND 2,400,0,15,1,2
2510 b$(mv)=LEFT$(b$(mv),mx-1)+"*"+RIGHT$(b$(mv),20-m
x)
2520 bb=bb+1
2530 sc=sc+100+10*bb
2535 LOCATE 11,24:PRINT USING"####";sc
2540 IF bb<5*bh THEN GOSUB 8200:RETURN
2550 bb=0
2560 GOSUB 4000
2570 sheet=
2575 mx=20:mv=6
2580 GOSUB 8200
2590 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(201
);LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
2600 RETURN
3000 REM *burn fuse*
3005 ft=ft+1:IF ft<4 THEN RETURN ELSE ft=0
3010 fl=fl+1
3020 LOCATE fl+1,22:PRINT CHR$(219);" "
3030 IF fl=19 THEN RETURN
3035 SPEED INK 2,2
3040 FOR k=1 TO 15
3045 SOUND 7,0,20,(15-k)/2,0,0,k
3046 FOR f=0 TO 3:INK f,INT(RND*27),INT(RND*27):NEXT
3050 NEXT
3055 INK 0,0:INK 1,24:INK 2,6:INK 3,11
3060 LOCATE#1,bx*2-1,bv*2-1:PRINT#1," "LOCATE#1,bx*2
-1,bv*2:PRINT#1," "
3070 b$(bv)=LEFT$(b$(bv),bx-1)+" "+RIGHT$(b$(bv),20-bx
)
3075 ll=ll-1
3080 IF ll=-1 THEN de=1:RETURN
3085 LOCATE 1,25:PRINT STRING$(11,216);" "
3090 PEN#1,2:LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(212);
CHR$(213);LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(214);CHR$
(215);:PEN#1,0
3095 mx=20:mv=6
3100 LOCATE#1,mx*2-1,mv*2-1:PRINT#1,CHR$(200);CHR$(20
1);LOCATE#1,mx*2-1,mv*2:PRINT#1,CHR$(202);CHR$(203);
3110 GOSUB 8200
3120 RETURN
4000 REM *game over*
4005 WHILE SQ(2)<>4:WEND
```

```
4010 CLSW2
4020 LOCATE#1,2,2:PRINT#2,"GAME  OVER"
4030 RESTORE 4070:FOR k=1 TO 4:READ N:FOR F=0 TO 2:SOU
ND 2,F,N*(2^F),105,5,2,0:NEXT:NEXT
4035 DATA 358,379,426,478
4040 IF SQ(4)<>1 THEN 4240 ELSE RETURN
5000 REM *instructions*
5010 CLSW1
5020 WINDOW SWAP 0,
5030 PRINT:PRINT TAB(15);CHR$(164);" CT 'BS"
5035 PRINT:PRINT
5040 PRINT"  Hello Arnold the Anarchist find his
 Lost Bomb before it blows him up"
5050 PRINT:PRINT:PRINT"Keys":PRINT
5055 RESTORE 5070
5060 FOR k=1 TO 6:READ a$:PRINT TAB(6);a$:NEXT
5070 DATA"  Up","\  Down & Bonus","[  Left","X  Right
","A  Slide Left","S  Slide Right"
5080 PRINT:PRINT:PRINT TAB(12)"Space Bar To Start"
5085 WINDOW SWAP 0,1
5090 WHILE INKEY(47)=-1:WEND
5100 RETURN
6000 REM *bonus points*
6010 FOR k=1 TO 20:LOCATE#1,1,1:PRINT#1,CHR# 11):NEXT
6015 PEN#1,1
6020 FOR k=1 TO 39 STEP 2:LOCATE#1,k,19:PRINT#1,CHR#(2
08):CHR#(209):LOCATE#1,k,20:PRINT#1,CHR#(210)+CHR#(21
1):NEXT
6025 PEN#1,0
6030 b=(1+INT(RND*20))*2-1
6035 LOCATE#1,3,19:PRINT#1,CHR# 204);CHR#(205);:LOCATE
#1,3,20:PRINT#1,CHR#(206);CHR#(207)
6040 v=1:v=1
6050 LOCATE #1,x,y:PRINT#1,CHR#(200);CHR#(201):LOCATE
1,x,y+1:PRINT#1,CHR#(202);CHR#(203):
6060 IF INKEY(22)<>-1 THEN 6100
6065 x=x+vx
6070 x=x+2:IF x>41 THEN x=1:y=y+2:IF y>19 THEN LOCATE
#1,15,10:PRINT#1,"TOO LATE!!":SOUND 2,100,0,15,1,1:WH
ILE SQ(2)<>4:WEND:RETURN
6080 LOCATE #1,x,y:PRINT#1," ":LOCATE#1,x,y+1:PRI
NT#1," "
6090 GOTO 6050
6100 x=x
6105 LOCATE # ,x,1:PRINT#1,CHR#(200);CHR#(201):LOCATE#
1,x,k+1:PRINT#1,CHR#(202);CHR#(203):
6110 CALL &BD19
6115 k=k+1:IF k<20 THEN LOCATE #1,x,k-1:PRINT#1,"  ":G
OTO 6105
6130 IF x=b THEN LOCATE #1,15,10:PRINT#1,"BONUS POINTS
":score=score+b+25+(17-y):LOCATE 11,24:PRINT USING"
######";score:SOUND 2,400,0,15,1,2:WHILE SQ(2)<>4:WEND:RE
TURN
6140 LOCATE #1,15,10:PRINT#1,"MISSED IT":SOUND 2,800,
0,15,1,1:WHILE SQ(2)<>4:WEND:RETURN
7000 REM *start game*
7010 score=0:l=5:sh=1:ob=0
7015 v=20:bv=6
7015 GOSUB 8000
7030 LOCATE 11,24:PRINT USING"######" 0
7040 LOCATE#1,39,11:PRINT#1,CHR#(200);CHR#(201):LOCATE
#1,39,12:PRINT#1,CHR#(202);CHR#(203)
7050 LOCATE 1,25:PRINT STRING$(3,216)
7060 RETURN
8000 REM *set up board*
8010 PEN#1,2:FOR k=1 TO 10:b$(k)="**********"
:LOCATE #1,1,2k:PRINT #1:PRINT#1,b1$:NEXT:PEN#1,0
8020 FOR k=1 TO 15-3*sh
8025 x=1+INT(RND*20):y=1+INT(RND*10):IF MID$(b$(y),x,1
)<>"*" OR x=bv AND y=bv THEN 8025
8030 b$(y)=LEFT$(b$(y),x-1)+"@"+RIGHT$(b$(y),20-x)
8032 LOCATE#1,x*2-1,y*2-1:PRINT#1,CHR#(208);CHR#(209);
:LOCATE#1,x*2-1,y*2:PRINT#1,CHR#(210);CHR#(211);
8035 NEXT
8040 GOSUB 8200
8050 LOCATE 39,25:PRINT USING"##";sh;
8099 RETURN
8100 REM *place bomb*
8105 h=0:
8110 bx=1+INT(RND*20):by=1+INT(RND*10):IF MID$(b$(by),
bx,1)<>"*" OR bx=x AND by=y THEN 8110
8115 b$(by)=LEFT$(b$(by),bx-1)+"*"+RIGHT$(b$(by),20-b
x)
8120 LOCATE#1,bx*2-1,by*2-1:PRINT#1,CHR#(204);CHR#(205
);:LOCATE#1,bx*2-1,by*2:PRINT#1,CHR#(206);CHR#(207);
8125 LOCATE 1,22:FOR k=1 TO 22-2*sh:PRINT CHR#(217);CH
R#(210);:NEXT:PRINT
8127 ob=2*(22-2*sh):t=0
8130 RETURN
8200 REM *once only*
8210 SYMBOL AFTER 256:MEMORY &8999:SYMBOL AFTER 200
8220 SYMBOL 200,7,7,31,37,7,15,31,63
8230 SYMBOL 201,224,224,248,164 224,240,248,252
8240 SYMBOL 202,63,63,63,63,4,4,52,124
8250 SYMBOL 203,252,252,252,252,32,32,44,62
8260 SYMBOL 204,0,0,1,1,0,0,3,15,1
8270 SYMBOL 205,141,0,36,64,136,192 240,240
8280 SYMBOL 206,19,31,31,31,15,15,3 0
8290 SYMBOL 207,248,248,248,248,240,240,192,0
8300 SYMBOL 208,0,3,15,31,28,28,31,15
8310 SYMBOL 209,0,192,240,240,152,152,240,240
8320 SYMBOL 210,3,3,192,252,3,3,252,192
8330 SYMBOL 211,192,192,3,63,192,192,63,3
8340 SYMBOL 212,0,15,24,48,112,112,116,116
8350 SYMBOL 213,0,252,6,2,2,2,2,2
8360 SYMBOL 214,116,116 115,120,127,127,63,0
8370 SYMBOL 215,2,2,130 6,252,243,240,0
8380 SYMBOL 216,56,124,56,124,254,254,40,108
8390 SYMBOL 217,0,0,0,48,201,10,4,0
8400 SYMBOL 218,0,0,0,0,9,153,6,0,0
8410 SYMBOL 219,0,16,60,0,164,0,40,0
8500 RESTORE 9500:FOR k=0 TO 160:READ n:POKE &9000+k,n
:NEXT
9510 DATA 221,126,2,50,161,144,221,126,3,50
9520 DATA 162,144,221,126,0,254,1,202,26 144
9530 DATA 254,3,202,87,144,201,6,0,197,17
9540 DATA 167,144,42,161,144,1,,,0,237,176
9550 DATA 237,91,161,144,42,161,144,1,2,0
9560 DATA 9,1,78,0,237,176,237,91,161,144
9570 DATA 33,78,0,25,229,33,163 144,1,7
9580 DATA 0,237,176,42,161,144,,,0,0,9
9590 DATA 34,161,144,153,16,198,201,6,0,197
9600 DATA 17,163,144,42,161,144,1,78,0,9
9610 DATA 1,2,0,237,176,42,161,144,1,178
9620 DATA 0,9,1,2,0,237,176,42,161,144
9630 DATA 17,77,0,25,255,42,161,144,1,77
9640 DATA 0,9,3,237,184,237,91,161,144,33
9650 DATA 163,144,1,2,0,237,176,42,161,144
9660 DATA 1,0,8,9,34,161,144,195,16,185
9670 DATA 201
9680 MODE 1
9690 n=0
9700 WINDOW #1,1,40,2,21
9705 WINDOW#2,15,26,12,14
9710 INK 0,0:INK 1,24:INK 2,6:INK 3,11
9720 BORDER 0
9730 PAPER 0:PEN 1
9735 PAPER #1,3:PEN #1,0
9737 PAPER#2,0:PEN#2,1
9740 CLS:CLS#1
9745 LOCATE 12,1:PRINT"T I M E  B O M B"
9750 LOCATE 5,24:PRINT"SCORE:";USING"######";0:PRINT"
  HIGH SCORE:";USING"######";hi:LOCATE 33,25:PRINT"SH
EET: 0"
9800 DIM b$(18)
9810 FOR k=1 TO 20:b1$=b1$+CHR$(212)+CHR$(213):NEXT
9820 FOR k=1 TO 20:b1$=b1$+CHR$(214)+CHR$(215):NEXT
9900 ENT -1,10,4,,1,-20,1
9910 ENV 1,15,-1,0
9920 ENT -2,10,-5,1,1,20,1
9925 ENV 2,15,-1,7
9930 RETURN
```

COMMODORE 64, BBC AND SPECTRUM

```
5 REM   HEX LOADER FOR CBM 64   FIG.1
6 REM
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT:IF T=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA ";T-6716:END
40 DATA 169,1,133,186,169,1,133,187,84
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 60,79,87,78,76,79,60,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS";A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT:PRINT"ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINT A;:INPUTD$
160 IF D$="END" THEN GOTO 900
170 IF LEN(D$)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH" GOTO 150
190 FOR B=0 TO 7:B$=MID$(D$,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
210 POKE A+B,D:T=T+D:NEXT
220 B$=MID$(D$,16,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A = A+8:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+I)C$"??"
290 B=8:NEXT:GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B$)
310 C$=MID$(B$,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D*16+X:NEXT:RETURN
400 X=ASC(C$)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H$="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;"? ";:T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT"=";
550 Y=INT(T/256):PRINT MID$(H$,Y+1,1);
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 500
600 PRINT MID$(H$,INT(X/16)+1,1);
610 PRINT MID$(H$,1+(X AND 15),1);:RETURN
800 SYS 680:C$=CHR$(34)
810 PRINT:PRINT" TO RELOAD CODE :"
815 PRINT:PRINT" LOAD"C$"DOWNLOAD";
820 PRINTC$",1,1 (RETURN)"
825 PRINT:PRINT" THEN TYPE  NEW";
830 PRINT" (RETURN)"
835 PRINT:PRINT"TO RUN THE PROGRAM";
840 PRINT" SYS 51000 (RETURN)"
900 PRINT:PRINT"1 ENTER DATA"
910 PRINT:PRINT"2 PRINT DATA"
920 PRINT:PRINT"3 SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via *Your Computer's* Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```
51000 ? A9068D21D8A8D00D0C=3E2
51008 ? A90A8D8502A90E20=2E4
51016 ? D2FFA9008D15D0A9=4D1
51024 ? FF8D0A02BA8E92CE=510
51032 ? 20CAC920C7CB20F8=4D5
51040 ? CAAD80CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=419
51064 ? 20D2FF202FC3D0DB=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95A85FD=4A1
51096 ? A90E85-E2328CDA0=547
51104 ? 002095CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D007A944=4EF
51128 ? 20D2FFA00085BA20=4B9
51136 ? 25CDA903203BCCA9=4A3
51144 ? BD85FDA9CD85FEA0=6A0
51152 ? 002095CC2025CD20=383
51160 ? 95CC984EA0048C83=4CC
51168 ? CE20B0968A92025=4C4
51176 ? CD2095CC9843A906=4C5
51184 ? 8D33CE20D8C9ADA7=5E3
51192 ? CE85FBADA8CE85FC=6EA
51200 ? 68A8206OCBA501E5=38A
51208 ? B85B598A29310CE=539
51216 ? 20BUFFAEA3CEACA7=567
51224 ? CEE8D031C82025CD=479
51232 ? A9FB20D8FF20F1CB=597
51240 ? 6020A9CCC9D100E=3FE
51256 ? A90085C7A92020D2=3E3
51254 ? FFA90D20D2FF60A9=4E7
51272 ? 0D2029C8A90D20D2=306
51280 ? FF602063CCA000A9=43F
51288 ? FF9993CEC8D0FA20=5FB
51296 ? D2CB50FB20D2CBB0=5ED
51304 ? FB8D72CE900A8C7C=400
51312 ? CE8C7DCE202ECCAD=4D4
51320 ? 72CE29F0C980D0E4=5C6
51328 ? 20D2CB01A9973CE=599
51336 ? C820ECCC009UAF3=4EB
51344 ? A00AD76CE2980D0=492
51352 ? 0FA52B85F318A52C=3D8
51360 ? 6D75CE85FC4CAAC2-5E7
51368 ? AD78CE85H-EAD79CE=607
51376 ? 85FC20D2CBB0A920=55E
51384 ? D9CC20D2FFC820D9=607
51392 ? CC202ECCC01D0CA-528
51400 ? A9202AD2FFAD75CE=56A
51408 ? 202ECD2ED2CBB087=4D7
51416 ? CI7CCEF00BA95820=503
51424 ? D2FF20303B4C57L8=52C
51432 ? 20D2C8B0F8CJ7DCE=65D
51440 ? D0EBAD75CEA8B993=687
51448 ? 20T2FF4C7EL34C57=51F
51456 ? C8A000CC7CUE8C7D=447
51464 ? CE20D2CBB0F091FB=5BF
51472 ? 202ECCC8CC77CED0=4D3
51480 ? F020D2CBB0E8CDFC=59E
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CBB0CE=4CE
51504 ? CD7DCEF0034C23C9=473
51512 ? 20RCC92030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CEC302D2520EC=436
51536 ? CBA9C820F3CBA9955=558
51544 ? 2015CDA9520F3C3=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CED02398D0F7=5D4
51568 ? 4C5IC7F95E2016CD=3D
51576 ? 20F1CB4C63C9A77=4EF
51584 ? CE2002C888D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53C
51600 ? 4C5CC9A52B85FBA5=4F5
51608 ? 2C85FCA000E1FB99=52A
51616 ? 2200C8B1FB8523=0=4CE
51624 ? 0BA52285FB0323B5=447
51632 ? FC4C9IC9:8A5FB69=57D
51640 ? FCE900852E853085=412
51648 ? 3260205CCA9028D=3E1
51656 ? 94CEA90B8D025E60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098DCDCE20FCE=414
51688 ? C914F016C90DF051=4E2
51696 ? C924D0192D2FF8D=544
51704 ? C3CEE84CE5C9E000=64B
51712 ? D0E3E00AF0FD2D2=554
51720 ? FFCA4CE5C9C93090=554
51728 ? D4C93A901548ADC3=444
51736 ? CEC924F004634CE5=460
51744 ? C95AC94190BFC947=4BA
51752 ? B03B20D2FF38E930=4D5
51760 ? C90A9002E907E005=36A
51768 ? F0FB9IC3CEE84CE5=61A
51776 ? C9E000FUA3E001D3=52A
51784 ? 07ADC3CEC924F095=4FF
51792 ? A9202D2FFA9FF9D=54F
51800 ? C3CEA200BECFCE8E=544
51808 ? D0CE8EI1CE8ED2CE=659
51816 ? FDC3CEC924D005A9=512
51824 ? 0F8DCDCE83DC3CE=5DD
51832 ? C9FFF01D20CBCAB0=5B2
51840 ? 3418BDC3CEEDCFCE=524
51848 ? 8DCFCEA5006DD0CE=566
51856 ? 8ID0CEB020E34C75=534
51864 ? CA9DCFCEHC83CE99=642
51872 ? A3CEC8ADD0CE99A3=660
51880 ? CEC8188C83CEACB2=561
51888 ? CEAE8ICE6A2025CD=4ED
51896 ? A200BD41CEC921F3=530
51904 ? 0720D2FFE34C3ACA=570
51912 ? 4CDEC9ADCDCE8DCE=65F
51920 ? CEADCFCE8DD1CEAD=6C1
51928 ? D0CE8DD2CE18ALD1=635
51936 ? CE6DCFCE8DCFCEAD=68F
51944 ? D2CE6DD0CE8DD0CE=6BE
51952 ? B035C2CECEDAE660=625
51960 ? 2063CCA90F8D8602=414
51968 ? A95185FDF9C185FE=575
51976 ? A002209DCC2025CD=343
51984 ? 209DCC209DCC2093=3JF
51992 ? CC2022CD20A9CC20=3A8
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CF8C62CE2069CC=4B2
52024 ? 20ECCC20CACCC900=48F
52032 ? D00D20FDCCC93!F0=4F0
52040 ? 062001CC4C35CB8D=314
52048 ? 00CEAE81CEFC82CE=597
52056 ? 60AES2CE9A4C5BC7=4CE
52064 ? 2022CDA92285FDA9=465
52072 ? CE85FE00020950C=4DA
52080 ? 2025CDA00FA92099=393
52088 ? 93CE8D0FA8I93CE=619
52096 ? 202FCB914D010C0=417
52104 ? 00F0F520D2FF8BA9=58F
52112 ? 209993CE4C00CBC9=50A
52120 ? 0DF00B20D2FF9993=4BD
52128 ? CEC8C010D8DAF920=579
52136 ? 20D2FF60A52020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52150 ? DEA9:20D00DE60A9-4CD
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996186D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? CC20ECCCCEO?CE00=677
52203 ? 02386020FDCCB0EE=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04CC86D0FAAC82CF=61C
52224 ? 602004CC84A298CA=3EE
52232 ? D0FDAA2069CC6020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCADEFCE20I2FF=573
52256 ? F92020D2FFA90320=3A5
52264 ? ABCC20D3C9504D7D=48A
52272 ? CE8D7DCEA20BAD7D-4AA
52280 ? CE2A0I9AD7DCE49=411
52288 ? 08BD7DCEAD7CCE49=460
52296 ? 18BD7CCE2E7CCE2E=3D5
52304 ? 7DCEC9D6163A000=516
52312 ? A900990D4C8C0!8=40E
52320 ? D0F660A99320D2FF=5B3
52328 ? 6048A9A2290FD01F=37E
52336 ? A5I44A95A2291UF0=491
52344 ? 05A9A44C8CCA920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC6B1FDC5=620
52376 ? 21D0F6C8602025CD=4B3
52384 ? A50C20ABCC2095CC=46D
52392 ? 60A9058E31CEAAA9=4E6
52400 ? 2020D2FFCAD0FAAC=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160F91460A9=456
52424 ? 7FE020E4FFC9C190=5C4
52432 ? 07C9DB00330E96U=4AF
52440 ? 50C941900EC95B90=494
52448 ? 08C961900EC97BB0=49C
52456 ? 0249206048A4802=2I5
52464 ? 20F1FFD0034C59CB=533
52472 ? 2868AA6860A0D0DE=485
52480 ? 49015A9003A90060=250
52498 ? A301JE6048AD00DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8I01IE20EC=508
52512 ? CC6020C5D2028CD=373
52520 ? A90D20D2FF604829=3A0
52528 ? F0A6A6A6A0930C9=3CA
52536 ? 3A3003186907202D2=21F
52544 ? FF68290F0930C93A=31B
52552 ? 3003186907202D2F=2F4
52560 ? 60444F574E4C4F41=2C4
52568 ? 44204D454E55213.=243
52576 ? 20202024543454549=228
52584 ? 5E45213520202045=1FE
52592 ? 58455420544F2042=289
52600 ? 4153494321362020=22F
52608 ? 20534156454204259=28A
52616 ? 5445532:20205553=285
52624 ? 4520122053=44F50=26D
52632 ? 209220544F205245=2C4
52640 ? 545552452054F20=2CC
52643 ? 4D454E5520292145=28C
52656 ? 4E54455220454D=2F9
52664 ? 4245520214546420-281
52672 ? 4144445245535320=256
52680 ? 495320494E204845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D=500
52704 ? 2D9D9D56524546=481
52712 ? 49580574354420=305
52720 ? 2421535441524520=2E3
52728 ? 4144445245535320=31E
52736 ? 464F52204152454I=22D
52744 ? 20214649E414C20=1D3
52752 ? 4144445245535320=206
52760 ? 464F52041524541=238
52768 ? 202150524F47524I=22C
52776 ? 4D20544954C4520=237
52784 ? 284D41582031360=1F5
52792 ? 1048415227532929=219
52800 ? 21124E4F5420564I=21B
52808 ? 4C434492202052452=2B5
52816 ? 592041474194E20=249
52824 ? 3A20214445534320=216
52832 ? 4F52054415045520=26B
52840 ? 2020442-54202920=1E8
52848 ? 3F2100000000000=0D8
```

TELSOFT

A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the CEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR 60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=&6FFF
20 CLS:PRINT
30 INPUT ' START ADDRESS (Hex)";A$
40 A=EVAL("&"+A$)
50 IF A>&6FB7 THEN 200
60 IF A<&2A00 OR A>&6FE7 THEN 20
70 PRINT "A" "
80 INPUT ";" B$,C$
90 IF LEN(B$) <>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 J$= MID$(B$,2*N+1,1): GOSUB 300
130 IF E=1 THEN 260
140 I$= MID$(B$,2*N+2,1): GOSUB 300
150 IF E=1 THEN 260
160 B= EVAL("&"+M:D$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT
190 FOR M = 1 TO LEN (C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E =1 THEN A=A-1: GOTO 260
220 NEXT
230 IF T= EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-8:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=A*(A DIV 8):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6F87
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

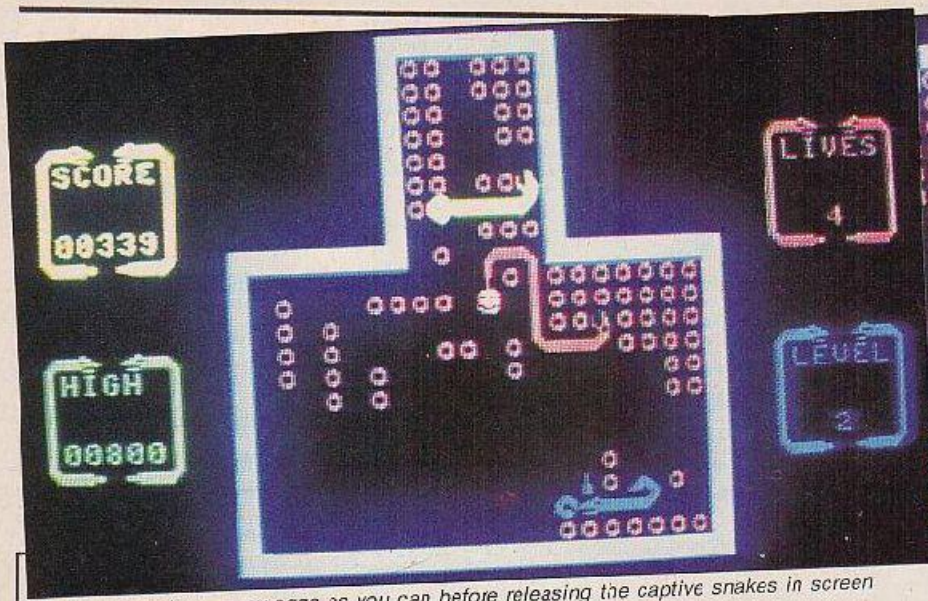
```
6A00 :A9C8A8FEA20120F4,4C6
6A08 :FF206:6C204A6DC9,38A
6A10 :31F008C934F0E9C9,4CE
6A18 :35F0054C4C0A4C47,200
6A20 :6A9F0C20E3FFA9EE,4B2
6A28 :A00BA2FF20F4FFA9,4FD
6A30 :03A20B20F4FFA902,363
6A38 :A202200F4FFA9C8A0,4C8
6A40 :FEA20200F4FF60A9,4B2
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120F4FFA000,3E8
6A58 :69FF8099856FD0FA,5E7
6A60 :4915A20120F4FF20,354
6A68 :0C6C90FE200C6CE0,34B
6A70 :FBA000847B4780E4,416
6A78 :79847A847B857020,38B
6A80 :D56A57029F0C900,439
6A88 :D0E2200C6CE0BD099,45B
6A90 :7100C920D56DC009,364
6A98 :D0F8A000A5742930,422
6AA0 :D0B9A51C95761BA5,354
6AA8 :1D657305772B0C6C,289
6AB0 :B085203FFC020D5,524
6AB8 :6DC0A20F0A57320,435
6AC0 :B26D20C6CB0A0C5,3CC
6AC8 :7AF00BA95B20E3FF,17B
6AD0 :20E7FF4C676A20BC,34F
6AD8 :6C000CC57EF000A9,48C
6AE0 :5820E3FF20E7FF4C,4AC
6AE8 :676AAC75A999956F,43E
6AF0 :D00E20E7FFA90020,3B0
6AF8 :E3FF4CB3684C676A,469
6B00 :A000847A847B200C,2C9
6B08 :6CB0F29176205D6D,477
6B10 :C0C475D0F1200C6C,45A
6B18 :D0F3C57AF00BA95B,4CE
6B20 :20E3FF20E7FF4C67,4B0
6B28 :F000A95B20E3FF4C,447
6B30 :676A20C76B20E7FF,429
6B38 :A573A0A9009705BF,3FA
6B40 :A5EAC902D05B20D7,419
6B48 :A5EAC902D05B20D7,419
6B50 :6A9C920556CA555,3BB
6B58 :20306EA9502056C,298
6B60 :A9150A2120F4FF20,394
6B68 :F76BA471C00B905,505
6B70 :6FD8519D0F7A98C,4A4
6B78 :20E3FF20A56DA75A,437
6B80 :B532A96F05B3A907,3D7
6B88 :20006E20F9B0200A0,2DB
6B90 :6DA9052006E09BB,2DA
6B98 :20E3FF20FB6DA9D2,502
6BA0 :20E0FF4C0C6AA955,3BF
6BA8 :20E3FF20FB6DA9D2,502
6BB0 :4C6A6BA475200C6C,2D2
6BB8 :B8D0FA200C6C200C,316
6BC0 :6C4C4B6B4C6C6AA9,336
6BC8 :2020C3FFA96F20E3,430
6BD0 :FFA96B20E3FF60A9,51E
6BD8 :5CA000A6BAE00200,41E
6BE0 :0BA2132DF4FFA212,387
6BE8 :20F4FF60A29:20F4,4C0
6BF0 :FFA2920F4FF0007,553
6BF8 :9CA000A6BAE00200,41E
6C00 :EBA25320F4FFA252,4E7
6C08 :20F4FF6010A99605,44F
6C10 :3F047EA9:120020,33D
6C18 :F4FFB009C007D005,448
6C20 :6B684C0C6AA47E20,204
6C28 :496CC63FD0023860,374
6C30 :A50AC982D0062079,369
6C38 :6E80EC60A991A201,447
6C40 :20F4FF90A47E80DF,35C
6C48 :60AA02C4E80CA00.5AA
6C50 :FBA06A900847EA8,458
6C58 :20496C8BD2FA047E,449
6C60 :60A9E8A000A2FF20,452
6C68 :F4FFA9000BAA90C,460
6C70 :20E3FF20A86DA904,3E4
6C78 :20006EA9090502A9,2F0
6C80 :6FB583A00020FB6C,39C
6C88 :20156DC941F008C5,370
6C90 :42F011C943F01/4C,3A2
6C98 :616CA900B120120F4,335
6CA0 :FF4C876CA900EA203,3C4
6CA8 :20F4FF4C876CA9BA,433
6CB0 :A20420F4FFC4BAA5,4CE
6CB8 :3C20E3FFA47E20A8,46B
6CC0 :6DA9B2000E20FB,2C4
6CC8 :6DA01720156DC941,200
6CD0 :F00DC947F011C943,4:3
6CD8 :F0174C616CA90742,372
6CE0 :0120F4FF4C096DA9,37F
6CE8 :07A20320F4FF4C89,314
6CF0 :6DA907020420F4FF,3D6
6CF8 :E6BA5EAC907D009,443
6D00 :A9E3A00A20120F4,3E8
6D08 :FFA57C20E3FF2053,495
6D10 :6C20536C6020AE6D,2E3
6D18 :A9E020006C20F96D,2C1
6D20 :20AB6DA90520006E,274
6D28 :20FB6D20AE6DA905,36B
6D30 :20006E20FE6D20AB,2DE
6D38 :6D017E0A9020086E,2A9
6D40 :A9222E0FF057C60,4DB
6D48 :A90C20E3FF20AB6D,3DF
6D50 :A9072006EA9YA0D,326
6D58 :82A95E5B3A00020,361
6D60 :FB6D20A66D20996D,3C0
6D68 :20996D20996D20AB,3:7
6D70 :6DA90A2000E20FA,2D6
6D78 :5D20AB6DA9022000,270
6D80 :6E20FB6D20AB6D20,34B
6D88 :E7FFA9D220E0FF38,5AB
6D90 :A90F0A20020F4FF58,3D5
6D98 :60A9BD2006E20FB,2B7
6DA0 :6D20AB6D6020A66D,33A
6DA8 :20AB6D20E7FF20E7,145
6DB0 :FF404829F06A6A6A,3FE
6DB8 :6A9330C93C300310,1F1
6DC0 :69072003FF68270F,312
6DC8 :0930C93A3B031869,1F0
6DD0 :0720E3FF68457B85,3AE
6DD8 :7B4200A5792A90AC,30B
6DE0 :A57B4900857BA57A,390
6DE8 :491057A267A2678,299
6DF0 :CAD0E86020E3FFCB,5AC
6DF8 :B192C90D00F6CB60,4F7
6E00 :B67DA9A920203FF,478
6E08 :CAD0FA467D6029FF,55F
6E10 :D00BA9B620F4FFE0,4FD
6E18 :B0F012A97FC92080,3C3
6E20 :0EC9EAF00AC900F0,3A1
6E28 :06C907F002A90060,2D1
6E30 :857C867D347EA99:,440
6E38 :A20120F4FFA0?3A2,484
6E40 :87206F4FFA99A203,483
6E48 :20F4FF9E2902F0F4,48A
6E50 :A47CA997A20720F4,4:F
6E58 :FA903A20420F4FF,464
6E60 :A991A20820F4FF80,47F
6E68 :09C007D0056B084C,2C1
6E70 :0C6AA57CA67D047E,3DC
6E78 :6B84/E067DA09442,446
6E80 :0020F4FF9B2991F0,3CD
6E88 :08A996A209206F4FF,408
6E90 :9B1B9B013BA67DA4,348
6E98 :7C6444AF574E1C4F,2B1
6EA0 :414449AE47204D45,213
6EA8 :4E5SD3S45542042,1AE
6EB0 :4543545956450D34,1F2
6EB8 :7020D5345542042,1AE
6EC0 :6175642052617463,2C6
6EC8 :0D3520202045504?,188
6ED0 :5420544F20424153,20D
6ED8 :49430D454E544552,217
6EE0 :0D4E5D4B2485?0D.1F6
6EE8 :2020553542054,3FE
6EF0 :524C2D472054 4F20,1F5
6EF8 :52455455524E2054,254
6F00 :4F20AD454E552029,1ED
6F08 :0D5345542054524,400
6F10 :4E534D49542042 61,24E
6F18 :75642052617465 0D,292
6F20 :4120202037352042,16F
6F28 :6175642042202033,1FC
6F30 :3020204261756400,209
6F38 :4320313230302042,188
6F40 :61756400D5345542 0,253
6F48 :2249345445 4520,223
6F50 :42617564 52617 4,203
6F58 :6500D0524F475241,23D
6F60 :4D2020C4F41445,1F2
6F68 :442020BF00D5052,20D
6F70 :4553532041 4E920,213
6F78 :4E455920454F5220,210
6F80 :4D454E550D202020,1A2
```

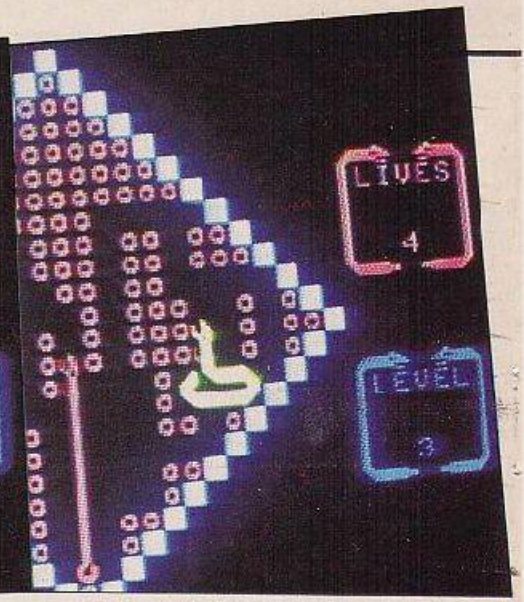
Figure 1. Spectrum.

```
5 REM SPECTRUM 48k      fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23658,8: CLS : PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 200
60 IF a<60000 THEN GO TO 20
70 PRINT a;
80 INPUT " ";b$
85 IF b$="END" THEN GO TO 280
90 IF LEN b$<>20 THEN GO TO 260
100 LET t=a-256*INT (a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300: LET y=x
130 IF e=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300: LET y=y*16+x
150 IF e=1 THEN GO TO 260
170 POKE a,y: LET a=a+1
180 LET t=t+y: NEXT n: LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300: LET y=y*16+x
210 IF e=1 THEN LET a=a-1: GO TO 260
220 NEXT m
230 IF t=y THEN PRINT ";";b$: GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-8: GO TO 50
260 PRINT "Typing Error"
270 LET a=8*INT (a/8): GO TO 50
280 SAVE "download"CODE 60000,1136
290 POKE 23658,8: STOP
300 LET e=0: LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET e=1
320 RETURN
```

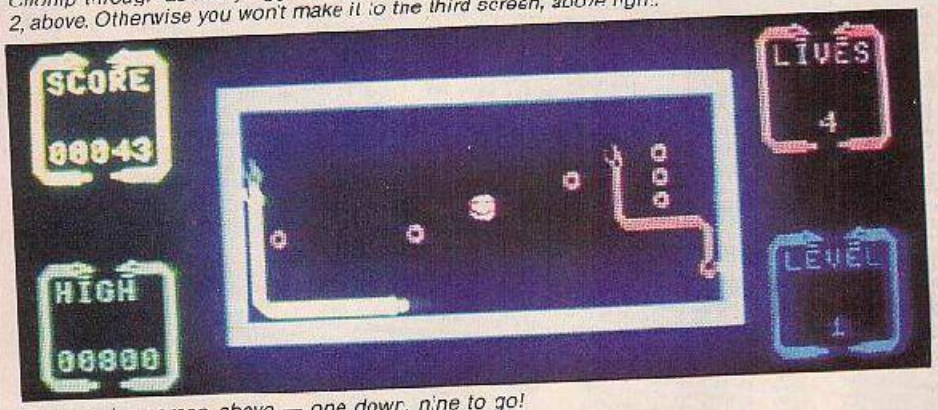
Figure 2. Spectrum.

```
60000 :CD15EDC307ECCD15,4C7
60008 :FCCD36ECCD66ECD,631
60016 :50ECCD47EE38FBCD,3AF
60024 :BBECFE31CA49EAFE,69A
60032 :35CA87EAC366EACD,5D0
60040 :15E03EFACD84ECD5,5FD
60048 :15EDC9CD13EDC366,553
60056 :EACD66ED11E5E006,58C
60064 :803EFF121310FCCD,45B
60072 :15EE11CDEE86173E,3D2
60080 :201213:0FCCD1FFD,3DA
60088 :30F0CD50ECDD1FED,5BB
60096 :30FB3265EF3E0032,3E9
60104 :6CEF325EF3270EF,544
60112 :3A65EFCDE8FC3465,5A1
60120 :FFE6F0FE0020DE0E,627
60128 :091165EFCD1FEDDA,501
60136 :AAEA1312CDEBEC0D,552
60144 :2023A69EFE6020,51A
60152 :00214B5C3A6BEF0E,36C
60160 :00470922ABEF0E00,1DA
60168 :11CDEECD1FED309F,47F
60176 :1213BCCDEBEC79FE,45C
60184 :1020F03A00EFCDDD,447
60192 :ECCD1FEDDAAAEA21,574
60200 :6FEFEE2B133E5B11,326
60208 :EBEE12133E0012CD,340
60216 :D7ECCDAAFCC3AAEA,6B1
60224 :CD1FEDDAAAEA2178,51B
60232 :EFBE20E12:E5EE3A,524
60240 :6BEF056F3E00BC67,3CC
60248 :3A2132B05CC3FFEB,483
60256 :3E21320B05CC3FFEB,483
60264 :3E00326FEF3270EF,3C7
60272 :ED5B69EF0E00CD1F,40C
60280 :EDDAAAEA3273EFCD,634
60288 :EBEC3A6BEFFE0020,5A4
60296 :053A69EFE6003A73,432
60304 :EF1213BC3A6AEFB9,3FC
60312 :20DCCD1FEDDAAAEA,5DB
60320 :210FEFDCC22EEACD,5E4
60328 :1FEDDAAAEA2170EF,5A2
60336 :BEC22DEB3E6F32E2,589
60344 :EE3E6B32E3EE3E00,498
60352 :32E43E3A8B5CFE21,581
60360 :2003CD15EECDD7EC,553
60368 :CDA6EC21E5EE3A68,525
60376 :EF056F3E000C6736,422
60384 :0021E5EED4B66EF,561
60392 :3C7EFE00C2DEA23,4FC
60400 :8D20F63EFACDB4ED,589
60408 :3E0ID3FEC366EACD,5EB
60416 :1FED30FBC3D0EAF3,594
60424 :0603AF13CF1BF3E,3DB
60432 :40D3FF3EFFD3FF3E,56F
60440 :31D3FF3E0F320F5C,395
60448 :320D5C324B5C3E01,250
60456 :03FF21915CCB9EFB,56B
60464 :CD50EDC366EACD15,52F
60472 :EECD66ED3E01D3FE,556
60480 :2165EE3E00CD0FEC,442
60488 :CD84ECCDA3ECCDA6,661
60496 :CDA0ECCD84ECCDA6,661
60504 :EC23CD77ECCD77EC,3DF
60512 :EC23CD77ECCD77EC,3DF
60520 :84EC23CDA3EC3E03,498
60528 :CD84ECCD84CCC9CD,4BB
60536 :A3EC3E07CD8FECCD,561
60544 :84EC23C97EFE00CB,520
60552 :CD3BED23C3B4ECFE,651
60560 :0020F3E28CD8EBED,520
60568 :F13DC38FECCD4BEC,65D
60576 :CDA3ECCDA6EC3E0D,5A6
60584 :CDBBED3EFF320C5C,574
60592 :C9F513E6F0CB:FCB,6DC
60600 :1FCB1FCB1FF630FE,4U5
60608 :3AFAC5ECC6071213,498
60616 :F:E60FF630FE3AFA,606
60624 :D4ECC607:213C92:,46C
60632 :CDEEE5CUB4FCE184,69C
60640 :173E2077231BFC3E,339
60648 :0077C9E52170EFAE,53B
60656 :77C50E0E7EA7CB17,449
60664 :300D7ECC08773AAF,329
60672 :EFEE10326FEF3721,3D5
60680 :6FEFCB1623CB:6D0,358
60688 :20E2C1E1C9110501,394
60696 :216A00CDB503C93E,32F
60704 :963277EFCDA7EDDA,529
60712 :2EEDF1C36eEACDAC,5C8
60720 :ED7BE601F602D3FE,548
60728 :AF2177EF3520237,2FC
60736 :C9CD:7ED30C0C9CD,5F0
60744 :47EEDBFECBC837C9,5E6
60752 :F5DBFF3AB1EFFE00,5C7
60760 :20043E3610023E37,187
60768 :D3FFDB7FF1C9F53A,675
60776 :81EFFE002004 3E36,376
60784 :D3FFCD5BEDF1C93E,644
60792 :00DBFFE6003C8DB,59.
60800 :FFE40237CBDBFFE6,626
60808 :302004D87F47C93A,3E0
60816 :B1EFFE002004 3E37,397
60824 :10023E36D3FFDB7F,452
60832 :C9CD47ED3A73EFDB,5DE
60840 :F1C366EAF53ED23D,3EE
60848 :20FDF1C9CDACED3D,52A
60856 :20FAC9C5D5E5F5FE,70D
60864 :7F2B13CDF9EDFE0C,537
60872 :20DCD:B2003E20,2BA
60880 :D73E0DD71610 3E20,34F
60888 :D73E0DD73A8B5CFE,4E8
60896 :212003E08D73E5F,2E6
60904 :D73EBBD7F1E1D1C1,640
60912 :C9FE0720FCFECB20,4F3
60920 :19FE0C2014FE0E2B,3B8
60928 :1AFE0D280CFE20FA,367
60936 :0F1E00F1E3E,4BA
60944 :00C93E07C9CD6B0D,32C
60952 :3E02CD0116 3E1832,1C4
60960 :B9FCC93E12160ICD,302
60968 :1122C93E12160CD,257
60976 :1122CY:DD5E53E02,3FB
60984 :CD0116CD47EE38FB,451
60992 :CD5CEEE1D:C1C93A.5CD
61000 :3B5CCE6F280C3A0B,20F
61008 :5CFB213B5CCBAEF1,4C3
61016 :A7C937C9F511:000,3DE
61024 :CD10EDF1C9444F57,4D6
61032 :4E4C4F414449 4E47,2B4
61040 :204D454E550D3120,216
61048 :2020524543454956,275
61056 :45003520202045 78,217
61064 :69742074 6F204261,32B
61072 :736963002025573,2DF
61080 :65205379 5D620F6C,393
61088 :2053686956742020,30B
61096 :204780746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520200045,27B
61120 :4E5445522004 20000,1C1
61128 :4245522000200000,1C1
```





Chomp through as many eggs as you can before releasing the captive snakes in screen 2, above. Otherwise you won't make it to the third screen, above right.



The opening screen above — one down, nine to go!

Listing 1. The hex loader.

```
10 PRINT"□□              SNAKES 64 H
EX LOADER□□"
20 INPUT" START ADDRESS";SA
25 PRINT
30 FORAD=SAT020992STEP10
40 CH=0:PRINTAD;:INPUT"□";H$
43 IFH$="S"THEN170
45 IFLEN(H$)<>20THEN40
50 FORI=0TO9
60 X=ASC(MID$(H$,I*2+1,1))
70 Y=ASC(MID$(H$,I*2+2,1))
80 X=X-48:IFX>9THENX=X-7
90 Y=Y-48:IFY>9THENY=Y-7
100 POKEAD+I,X*16+Y:CH=CH-X*16+Y
110 NEXTI
120 PRINTTAB(29)"□CH";:INPUTC
130 IFCH=CTHENL60
140 PRINT" CHECKSUM ERROR! TRY A
GAIN."
150 GOTO40
160 NEXTAD
170 INPUT"□ FILE NAME";F$
180 FORI=1TOLEN(F$):POKE39999+I,
ASC(MID$(F$,I,1)):NEXT
190 POKE780,I:POKE781,1:POKE782,
1
200 SYS65466
210 POKE780,LEN(F$):POKE781,64
220 POKE782,156:SYS65469
230 POKE252,136:POKE253,54:POKE7
30,252
240 POKE781,0:POKE782,82:SYS6543
6
```

Listing 2. The code.

```
13960 : EDED0200209BA5000000  CH: 828
13970 : 08429BA5008100008100  CH: 652
13980 : 000000000F0033003300  CH: 117
13990 : 3300330033003300000   CH: 204
14000 : 0000FFFFFFFF3FFF001D  CH: 1367
14010 : FFFFFF3F00FFFF000000  CH: 1333
14020 : 0000010002030405060   CH: 28
14030 : 1A0B1B0E1B0C1B0D1A0D  CH: 193
14040 : 1A0C1A0B1B0B1B0C1B0D  CH: 192
14050 : 1A0D1A0C0AFFAMAMAFAF  CH: 381
14060 : 0E0C0E0D0D0D0D0C0D0B  CH: 128
14070 : 0E0B0E0C0E0D0D0D0D0C  CH: 129
14080 : 00FF0C120D120D130D14  CH: 381
14090 : 0C140C130C120D120D13  CH: 150
14100 : 0D140C140C1300FF1304  CH: 374
14110 : 140414051406130613 05  CH: 124
14120 : 130414041405140613 06  CH: 123
14130 : 130500FF1A121B121B13  CH: 414
14140 : 1B141A141A131A121B12  CH: 227
14150 : 1B131B141A141A1300FF  CH: 439
14160 : 0B0BC0B0C0C0C0D0B0D  CH: 118
14170 : 0B0C0B0B0C0B0C0C0C0D  CH: 117
14180 : 0B0D0B0C00FF13041404  CH: 349
14190 : 140514061306130513 04  CH: 123
14200 : 140414051406130613 05  CH: 124
14210 : 00FF1B0B1C0B1C0C1C0D  CH: 413
14220 : 1B0D1B0C1B0B1C0B1C0C  CH: 196
14230 : 1C0D1B0D1B0C00FF1312  CH: 412
14240 : 141214131414131413 13  CH: 194
14250 : 131214121413141413 14  CH: 193
14260 : 131300FF0E050F050F06  CH: 353
14270 : 0F070E070E060E050F05  CH: 102
14280 : 0F060F0/0E0/0E060FF  CH: 339
14290 : 19051A051A061A071907  CH: 158
14300 : 190619051A051A061907  CH: 157
14310 : 1907190600FF0E110F11  CH: 381
14320 : 0F120F130E130E120E11  CH: 163
14330 : 0F110F120F130E130E12  CH: 164
14340 : 00FF19111A111A121913  CH: 429
14350 : 191319121911 1A111912  CH: 216
14360 : 1A131913191200FF0B05  CH: 403
14370 : 0C050C060C070B070B06  CH: 89
14380 : 0B050C050C060C070B07  CH: 88
14390 : 0B060FF100B110B110C  CH: 356
14400 : 110D100D100C100B110B  CH: 142
14410 : 110C110D100D100C00FF  CH: 371
14420 : 170B180B180C180D170D  CH: 178
14430 : 170C170B180B180C130D  CH: 177
14440 : 170D170C00FF0B110C11  CH: 383
14450 : 0C120C130B130B120B11  CH: 148
14460 : 0C11 0C120C130B130B12  CH: 149
14470 : 00FF0D0C0C0E0B100B12  CH: 361
14480 : 0A1209140914091408 16  CH: 145
14490 : 0816081608160816091 4  CH: 149
14500 : 0C140C140C120C120D10  CH: 141
14510 : 0C0E0D0C0D070E070E08  CH: 114
14520 : 0E090D090D080D070E07  CH: 107
14530 : 0E08CE090D090D0800FF  CH: 343
14540 : 130314031403140410 05  CH: 118
14550 : 130413031403140410 05  CH: 117
14560 : 1305130400FF19071A07  CH: 367
14570 : 1A081A0519091908 1907  CH: 168
14580 : 1A071A081A0919091908  CH: 169
14590 : 00FF190F1A0F1A101A11  CH: 421
14600 : 1911191019 0F1A0F1910  CH: 206
14610 : 1F1119119100 0FF1313  CH: 419
14620 : 141314141413151314 14  CH: 199
14630 : 131314131414141513 15  CH: 198
14640 : 131400FF0D0F0E0F0E10  CH: 381
14650 : 0E110D110D100D0F0E0F  CH: 147
14660 : 0E100E110D110D1000FF  CH: 375
14670 : 0B030C030C040C050305  CH: 78
14680 : 0B040B030C030C040C05  CH: 77
14690 : 0B050B040FF1C031403  CH: 331
14700 : 140414051305130413 03  CH: 118
14710 : 140314041405130513 04  CH: 119
14720 : 00FF1B031C031C041C05  CH: 381
14730 : 1B051B041B031C031C04  CH: 156
14740 : 1C051B051B0400FF030B  CH: 373
14750 : 0C0B0C0C3C0C0D0B0D030C  CH: 119
14760 : 0B0B0C0B3C0C0C0D03 0D  CH: 118
14770 : 0B0C00FF1B081C0B1C0C  CH: 395
14780 : 1C0D1B0D1B0C1B0B1C0B  CH: 197
14790 : 1C0C1C0D1B0D1B0C00FF  CH: 415
14800 : 0B130C133C140C150D15  CH: 158
14810 : 0B140B133C130C140C15  CH: 157
14820 : 0B150B1430FF1313141 3  CH: 395
14830 : 141414151315131413 13  CH: 198
14040 : 141314141415131513 14  CH: 199
14850 : 00FF1B131C131C141C15  CH: 445
14860 : 1B151B141B131C131C14  CH: 236
14870 : 1C151B151B1400FF8142  CH: 594
14880 : 5911119D9D9D9D9D9D9D  CH: 1222
14890 : 9D9D9D9A414C44455253  CH: 1070
14900 : 2020475553544146535 3  CH: 688
14910 : 4F4E0D11111D1D1D1C45  CH: 388
14920 : 415420544845204547 47  CH: 649
14930 : 532042592050415353 49  CH: 686
14940 : 4E47204F564552205448  CH: 685
14950 : 454D220D1D1D1D485554  CH: 323
14960 : 2041554F494420544845  CH: 660
14970 : 204445414440520534E  CH: 660
14980 : 414B45532E205748454E  CH: 676
14990 : 0D1D1D1D5448452524520  CH: 508
15000 : 415245204E4F20454747  CH: 648
15010 : 53204C4546542C20594F  CH: 658
15020 : 552043414E0D1D1D1D45  CH: 496
15030 : 415420544845 20534E41  CH: 664
15040 : 4845532E20424F4E5553  CH: 696
15050 : 204C494645204556455 2  CH: 658
15060 : 590D1D1D1D3:30303020  CH: 414
15070 : 504F494E54532E111111  CH: 574
15080 : 9D9D9D9D9D9E46312020  CH: 1120
15090 : 535441525420474141D45  CH: 712
15100 : 0D111D1D1D1D1D1D1D1D  CH: 262
15110 : 1D1D46332020474141D45  CH: 525
15120 : 2053504545443A0D111D  CH: 518
15130 : 1D1D1D1D.D1D1D1D1D46  CH: 331
15140 : 3520204D5553494320 4F  CH: 613
15150 : 4E2F4F46460D1111811D  CH: 549
15160 : 1D1D1D1D.D1D1D1D5055  CH: 397
15170 : 54204A4F5953544924D  CH: 740
15180 : 20494E20504F52542032  CH: 622
15190 : 9E534C4F5720209E4D45  CH: 851
15200 : 4449554D9E4641535420  CH: 795
15210 : 204C472D9D1151459D9D  CH: 968
15220 : 1149485454545459D9D9D  CH: 969
15230 : 9D1154202054 9D5D9D9D  CH: 1034
15240 : 1154202054 9D9D5D9D11  CH: 894
15250 : 5454545446444E1D5044  CH: 729
15260 : 47:19D45119D45119D45  CH: 800
15270 : 119D45119D9D9D5D9D9D  CH: 1202
15280 : 9D4944421D4044A9D9D  CH: 911
15290 : 9D9D9D9D9D9145519D45  CH: 1370
15300 : 919D45919D459E53434F  CH: 1129
15310 : 52459D9D9D9D9D111111  CH: 987
15320 : 1E4949749D9D9D9D9D11  CH: 900
15330 : 11111C4C49564553 9D9D  CH: 763
15340 : 9D9D9D1111111F4C4556  CH: 784
```

SNAKES

Nine screens of snakes coiled up inside your CBM-64. Serpents and eggs are on this unusual menu from Anders Gustafsson — eat them before they lunch you.

SNAKES IS a machine-code program for the CBM-64 and joystick. When you run it, you'll first be shown the title page and hear some music. After you have chosen your game speed, the game starts. On each screen there will be an area filled with eggs, and also a varying number of snakes. Only one of these, the red one, can eat eggs. This means that the other snakes are trapped until you or the red one let them out.

The object of the game is to eat all the eggs without being killed. When there are no eggs left, you can eat the snakes by crossing their tails, but you must still avoid their heads. And when the snakes are gone, the next screen is waiting for you. There are nine different screens available.

If you want to play the game, first type in the hex loader in listing 1. Run it, and input the start address. You can now enter the code, 10 bytes — no spaces — and a checksum each time. If there are any checksum errors, the program will tell you. You can save the code to tape at any time by typing S. When you have entered the code and saved it, you can hopefully run the program with

SYS 16384

If you think it's too much work to type the code in, I can supply you with a copy of the program on a cassette. Please send £3, name and address to: Anders Gustafsson, Krokelyckan 62, 421 70 V. Frölunda, Sweden.

```
15350 : 454C9D9D9D1111119D00  CH: 824
15360 : 43414A0000000000434 1  CH: 346
15370 : 4A0000080000434 14A00  CH: 288
15380 : 0008000043414A030008  CH: 222
15390 : 000043414A0030030000  CH: 214
15400 : 43414A0000030034341   CH: 346
15410 : 4A0000030000434 14A00 CH: 288
15420 : 0008000043414A030008  CH: 222
15430 : 000043414A0030030000  CH: 214
15440 : 00000FFFFF0F300018 18 CH: 588
15450 : 18183C3C3C3C000 0F0FF CH: 780
15460 : FFF000003C3C3C3C18 18 CH: 783
15470 : 18180000FFFFFFF0000   CH: 1068
15480 : 3C3C3C3C3C3C3C3C0000  CH: 480
15490 : 03070F1F3E3C0000C0E0  CH: 594
15500 : F0F87C3C3C7CF8F0E000  CH: 1760
15510 : 00003C3E1F0F07030000  CH: 178
15520 : 3C7EBFC7E7FF7E3C3C7F  CH: 1430
15530 : F7E7E7FF7E3C3C7EFFE7  CH: 1822
15540 : E3FD7E3C3C7EFFE7E7EF  CH: 1808
15550 : 5E3C00E0F83EFFC07C00  CH: 1259
15560 : 6C6E7B3939191803000 7 CH: 519
15570 : 1F7CFF033E001013989C  CH: 823
15580 : 9CDE76367FFF39FFFF3D  CH: 1783
15590 : C37E7BFF99FF3381C37E  CH: 1755
15600 : FFFFFFFFFFFFFFFF003C  CH: 2100
15610 : 7E66667E3C0038D11210  CH: 767
15620 : 00000EF13001F151000   CH: 390
15630 : 0410872110473603 1F15 CH: 341
15640 : 1087211047063 81F1510 CH: 353
15650 : 77073087211093051 00C CH: 543
15660 : 07104705087211 5H225  CH: 482
15670 : 10470608IF2703332A10  CH: 491
15680 : 4706087210892251061   CH: 573
15690 : 08103E2A10470603A51F  CH: 425
15700 : 10A22510E9073087211 0 CH: 703
15710 : 6103104706104705 0D1  CH: 508
15720 : 1210000008EF13081F15  CH: 360
15730 : 1030041087211047060 8 CH: 353
15740 : 1F1510872110470608 1F CH: 368
15750 : 15107707387211098 05  CH: 560
15760 : 100C07104705031 1C10  CH: 228
15770 : FB0408 1E1908B0171084 CH: 726
15780 : 0408311C08872110ED05  CH: 523
15790 : 103E2A10B40408A22508  CH: 535
15800 : 8721109805031 1C1085  CH: 607
15810 : 1F10230310872110860 3 CH: 422
15820 : 10A22510F40308D11210  CH: 729
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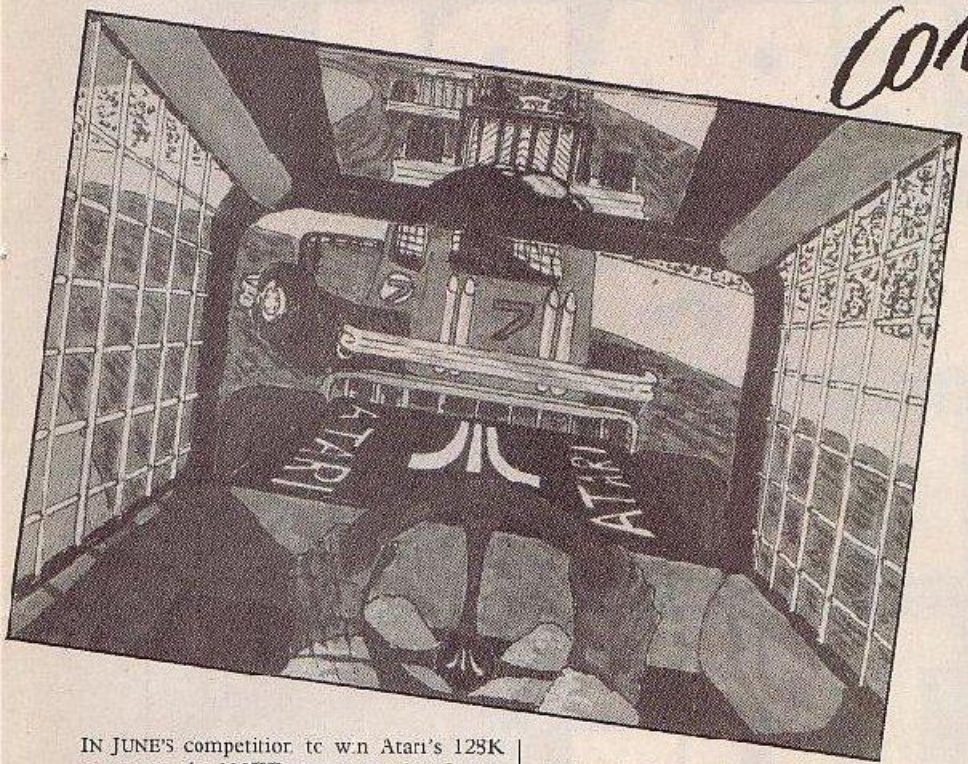
WIN AN ATARI 130XE competition RESULTS



J Stone's Battle of the Chevrolets.

IN JUNE'S competition to win Atari's 128K computer, the 130XE, you were asked first to write a plot for a game which could take advantage of the Atari's extra memory, then to name the five worst programs you ever paid money for. As a prize for the runners-up we offered copies of Firebird's Don't Buy This tape, a compilation of the five worst programs ever sent in for evaluation.

When we set the competition we thought we would be able to draw up a definitive list of the great software disasters of our time. As it turned out, there was almost no consensus on what is good and what is bad. No two entries agreed on more than one title. Some people even nominated such chart-toppers as Ghostbusters, Harrier Attack, and Jeff Minter's Gridrunner — in our book, one of the all-time greats. The moral seems to be that, as far as games are concerned, one man's meat is another man's poison, or as the Romans put it: De gustibus non disputandum est.

If there was one game that qualified for the title of worst-ever it was Legend's The Great Space Race — probably because it was so over-hyped and, at £14, over-priced. Among the other games that received at least three nominations apiece were: Alcatraz Harry, Blue Thunder, Flight Path 737, Mad Martha, Airwolf, Micro Olympics, Johnny Reb, Gulpman, Winged Avengers, Pedro, Zip Zap, JCB Digger, Schizoids, Ah Diddums.

You may be surprised to learn that the last three came from Imagine, a company responsible for some of the best games of 1983/84. But they date from the time when Imagine's production line was churning out programs at a rate of almost one a week.

No doubt some of these titles do not deserve their place on the list. People are often unduly severe on a game if it has been hyped up and then falls short of expectations. It is probably also unfair to compare games written in 1982 with today's software. Winged Avengers and Gulpman, for example, were produced when the Spectrum was in its infancy.

Admittedly, Winged Avengers — a monochrome shoot-em-up from a long-forgotten company called Workforce — was truly bad; but, for its time, Gulpman was one of the best Pacman games around. It is surprising nobody nominated Specman, Jega's version of Pacman on the Spectrum.

There were also scores of games that received only one nomination. Most of them have long since passed out of circulation. Who remembers Kosmic Piracy, Fred's Fan Factory, Astro Blast, or Carnival Massacre?

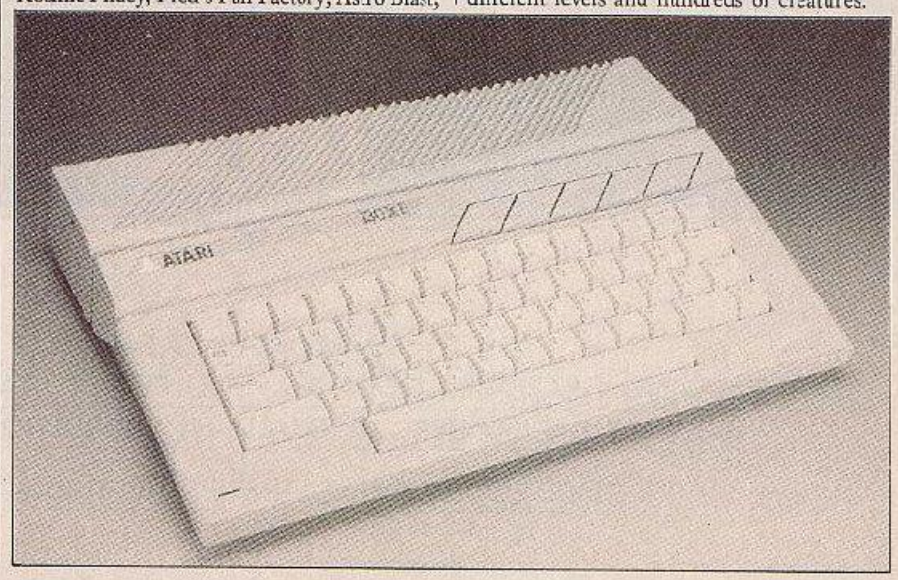
When it came to describing your ideal game for 128K, most of the entries were uninspired. In fact the bank-switched 64K is less of an advantage than you might think. It is unlikely that many software houses will write games which fully exploit the Atari's 128K. If they do use the extra memory it will be to store text and screen data rather than the game code itself.

This was the direction that most of the entries took: they wanted to see adventures with more locations and more graphics, and platform games with yet more screens. M. Topping suggested a follow-up to Elite with an adventure game element, in which you leave your ship and explore space stations. N. Snaith thought that 128K would be sufficient to stage a text and graphics version of Lord of the Rings.

Rather different was S. Patel's idea for a game called Father. In this, a boy has lost his father and has to find him by asking the computer questions about three possible candidates. The program needs 128K since it chooses the three men from a database of 100 characters, on each of whom there is an extensive dossier. J. Stones' Battle of Chevrolets was equally novel — a stock car racing game where instead of dodging other cars you have to collide with them.

All those mentioned above receive a runners-up prize, along with M. Simon, K. Etheridge, R. Drukker, C. Pearson, A. Bennet, A. Ahmad. We awarded the first prize to J. Davison, 44 West St, Great Garsden, Sandy, Beds. SG19 3AU. His ideal game, Zone, is not especially original but it is conceived on an epic scale. You have to retrieve a stolen reactor from the Zone.

The reactor has been broken up and its parts are scattered over a vast network of underground passages and caverns, with umpteen different levels and hundreds of creatures.



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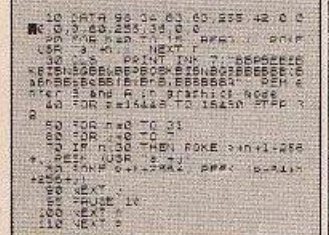
I could do that...

Never mind the text books — bolt-on programming is here to stay according to John Ransley, and here's your chance to prove that the unstructured approach can be effective, if not always particularly elegant, and earn yourself this month's First Bytes £15 program prize.

We want you to devise a short program that combines a loop and several uses of Gotos and/or Gosubs; the targets of which can be simple one-line statements rather than elaborate modules. Your purpose should be simply to effectively demonstrate some of the principles touched upon in John Ransley's article rather than produce a spectacular screen show.

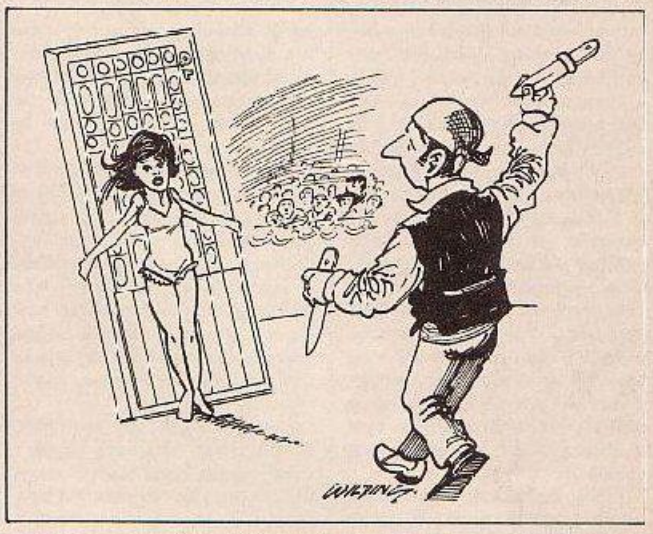
In July we set readers the task of creating an animated display by Poking to screen memory. The £15 prize goes to Martin Wright, 2 Rye Lane, Halifax, HX2 0QD. Apart from demonstrating the complexities of the Spectrum's display file, the program also shows that Poking to the screen is usually slower than printing.



BEGINNERS *first bytes*

Starting out in home computing? First Bytes is for you. Just write to *Your Computer* with any hardware or software problems, no matter how small or simple.

A bluffers' guide to micros



OF COURSE, there is always a danger that you will fall prey to the belief which prevails amongst outsiders to the computer fraternity that there is actually some reason for having a home micro. The half-hearted justification for originally buying a micro range from "it's important to keep abreast of new technology" to "it's important for the kids — computers are so important in education now."

These original excuses might be followed by a desire to make the micro of some use in the real world — hence the plethora of books which purport to show you how you can calulate the amount of wallpaper needed for the living room, shopping lists, telephone directories, television directories(!), freezer stock lists, calendars, bank statements, measurement conversion programs, car maintenance file, gas and electricity bills, VAT.

No-one in their right mind believes that switching a computer on, plugging it into the telly, loading a cassette or a disc and then accessing a file is any quicker than doing the calculation on the back of a bubblegum packet in the traditional way.

It just looks more efficient, and the hopelessly crazed user probably derives some tactile satisfaction from the use of the micro. Some people may regard this as unduly cynical — and as software for household book-keeping becomes more sensible and user-friendly perhaps people really will start filing bills on their home computer instead of in the wastepaper basket. But it is still camouflage, designed to disguise the fact that the home micro dwells in a realm of sublime abstraction.

The other good piece of camouflage is word processing. Rather like food processing, this is something that enables you to combine formerly discrete and interesting items into a bland tasteless mush. Everyone knows that word-processing makes it really easy to change paragraphs around in what you have written. You can just play with the text on the screen. You just scroll through the text, mark the paragraph you want to shift, scroll back, mark where you want it shifted to and give the order to shift it. Then you check through the text and find that because you forgot to mark the end of the paragraph you wanted copied nothing happens.

So you go back and mark the paragraph properly. The text is moved successfully. But don't forget to scroll back through the text and delete the marks relating to moving the paragraph about or the computer will get very confused. So far so good. Now all you have to do is print it out — that is, set the parameters on the printer, make sure you cleared the buffer if you've just been printing something out, maybe tell it to number the pages, and untangle the printout when it jams in the printer.

We are told that this is easier than buying a cheap typewriter and some Tippex, but realise that word processing serves two purposes. One, it disguises the abstract nature of the computer, and, two, it makes the writing process more interesting by substituting a whole new order of mistakes to make under the guise of dealing with human error.

Paul Bond

Speaking the right language is half the battle

IT IS ONLY fairly recently that computer manufacturers started to supply micros with a resident Basic. Many business micros only provide Basic on disc; while Apple's Macintosh comes without any high-level language, Basic or otherwise.

For home computer owners there is clearly an advantage to having Basic in Rom — it is instantly available as soon as the machine is turned on. But it also has its drawbacks. Unless you can switch the Basic Rom out — as on the BBC and the Amstrad — it takes up memory space even when it is not in use.

This means that other language interpreters or compilers must load into the area normally reserved for programs. More generally, resident Basic makes owners less likely to consider trying other languages.

There is much to be said for using an alternative language to Basic. For one thing, if it is a compiled language it will run much faster. Almost all home computers use Basic interpreters which take a program line at a time, translate it, and then execute it. Compilers, by contrast, translate high-level language programs into machine code before they are run. The resulting "object code" may not be as efficient as hand-crafted machine code but it is still substantially quicker than an interpreted program.

Apart from speed, there are other reasons why you should consider an alternative language. It is a matter of horses for courses: for particular applications some languages are more suitable and easier to write in than Basic. Forth, for example, would be a good language to choose if you wanted to write a program to control a robot arm. It was originally designed for control applications.

Logo supporters will tell you the language is capable of much more than just turtle graphics, and is well suited for list processing or writing database programs. They will even argue that a full version of Logo is more powerful

(continued on next page)

(continued from previous page)

than Basic.

Pascal demands a rigid program layout in which variables and procedures must be defined at the outset. It encourages disciplined programming with the emphasis on advanced planning and a structured approach. For this reason it is regarded as a sound language with which to teach programming.

If you are looking for a job as a programmer a knowledge of C will stand you in better stead than fluency in Basic. It is currently the most fashionable language around. Most new operating systems are now partly written in C, as are many successful application programs. At the same time as being highly structured, C allows you to get at the guts of a machine in a similar way to assembly language.

These languages are available on most home micros: although, in some cases, they are stripped-down versions such as Small C or Tiny Pascal. Other languages include Basic compilers, Lisp, BCPL, Comal, Prolog, and Cobol.

Each has its strengths and weaknesses; over the next few months we will be telling you what they are, as First Bytes takes a closer look at some of the more important languages.

Chris Lam.

BEGINNERS first bytes

Happiness is a thoroughly haywire program!

BEFORE SAVING enough pennies to buy my first computer — and like many other would-be micro owners, I suspect — I enjoyed a sort of voyeuristic love affair with the sylphs of silica city by reading *Your Computer* every month, eventually buying a couple of those early teach-yourself-Basic titles which looked as if they'd come from under the counter in an Old Compton Street bookshop and dealt with their subject just as predictably.

Not much was to be found in them about how to write a Pacman program or devise a neat database utility — instead, chapters on using your computer to work out acreages of carpeting or rivers of paint, or interesting exercises in calculating the fifteenth decimal point of Pi.

If those Puritan-severe tutorials did venture beyond the realm of numbing numeracy, it was only to remind the reader that structured programming was the Right Path Through Life. In other words, any and every program you wrote was bound to be interpreted as an algorithm in the form of program steps presented in strict chronological order of execution, branching or non-execution. Further, that even sparing use of subroutines was not only a sign of a snivelling surrender to convenience on the part of the programmer but was guaranteed to ensure that, worse, he would never be taken seriously by anyone who knew better.

Such counsel was enough either to send you rushing out to buy one of those plastic templates full of skewiff geometric shapes or force you into becoming a closet algorithmic anarchist — joyously peppering your programs with Gotos and Gosubs no matter what the consequences. In fact, such apparently irresponsible behaviour is but a sign that, programming-wise, you've grown up.

I'd like to find the guy who dreamt up the phrase 'structured programming" because he has much to answer for. Not least, for the souls who have fallen at the wayside endeavouring to follow his credinous creed, because trying to structure a computer program is like attempting to water-ski on blancmange — it's possible to do it but decidedly less invigorating than the alternative.

While professional programmers find that it's not a bad idea to scribble down their first thoughts on paper and to conceive of their implementation as a series of modules, from there on in it's usually a case of keyboard creation — with the finished program actually building on screen before their eyes and with not a plastic template in sight.

One of the arguments made in favour of the structured approach is that it makes it easy for anyone — including the author, even months later — to fathom out how the program works. So whatever happened to Rems? I bung a Rem in practically every other line of any program I'm developing, and Save a "library" copy of it with them intact.

I may knock them out to gain a little more speed and memory in the working copy — but even that's not necessary if one intends to produce a compiled version, because utilities such as the excellent Jetpack from Dataview Wordcraft automatically ignore all Rems anyway.

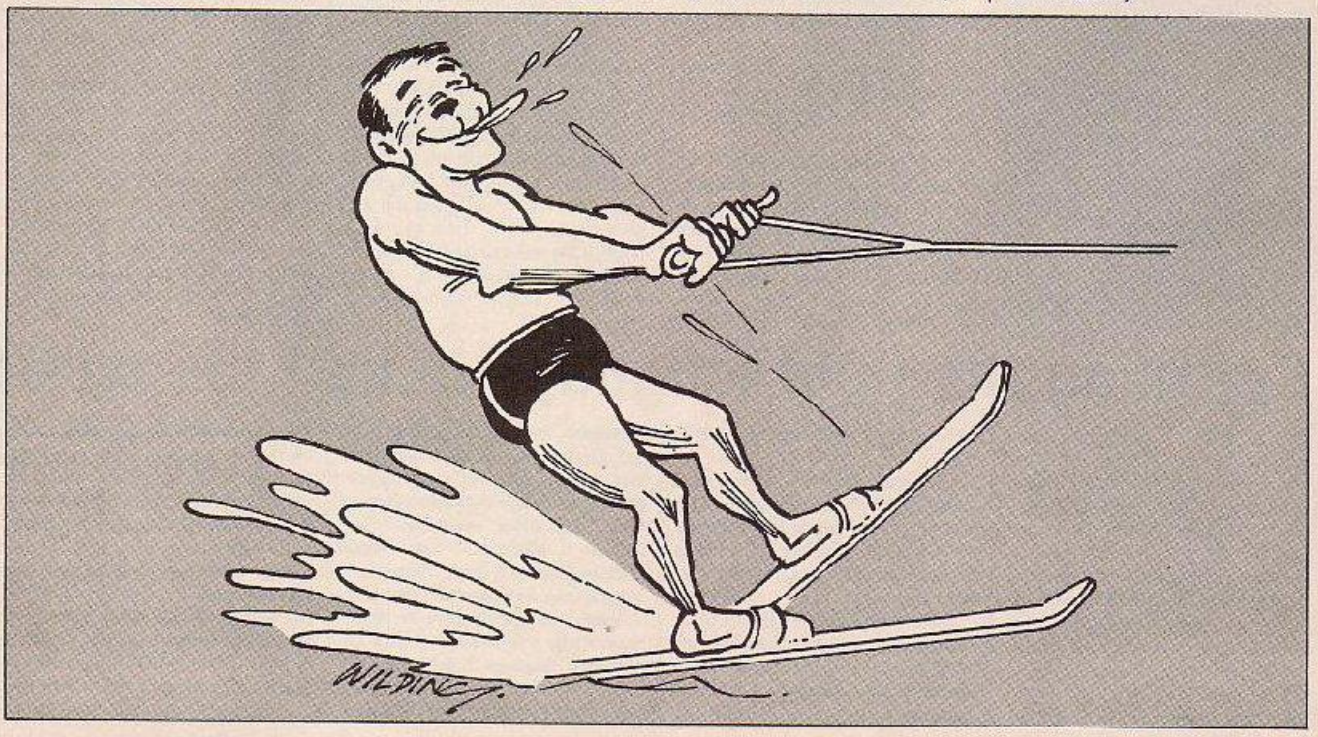
Another so-called advantage of the SP approach is that it makes for tidier programs. Are you tidy? Is Bob Geldof? Is the molecular structure of the Taj Mahal? Next question.

The algorithmics also lose hands down when it comes to usually the most important of all considerations — program execution speed. Particularly in games writing, you need to keep to the absolute minimum the number of lines contained within the primary loop; that used to test for keyboard or joystick inputs. Avoid preceding that loop with a chunk of program to set up, for example, the game's playfield design, user-defined characters and/or sprites and go instead for a single Gosub to a module beginning at a much higher line number.

This is because any Return or Goto usually forces a laborious count beginning at the very first line used all the way up to that which the Return logic or Goto dictates is the next to be executed.

Thus you should aim at starting the 'active' part of your program at the lowest line number possible and at keeping the loop itself short and sweet. Delaying the first and prolonging the second, as the structuralists would have you do, will result in a program that runs as fast as a concrete rabbit. Psst! Anyone wanna buy a programmer's template with a possible secondary application in cutting out marzipan shapes for *petit fours*?

John Ransley.



TOP★ TIPS

SCREEN FLIPPER

This is a machine code routine for the 48K Spectrum that creates a flipped mirror image of any screen, taking into consideration the colour attributes.

First type in the Basic program and run it. If you get the message

"LOADING IS OK"

then save the routine by typing

SAVE"FLIP"CODE 30000140

Now the routine is ready to work, all you have to do is to load any screen and then type RANDOMISE USR 30000.

Hany Kilany.

```
  1 LET COUNT=0
  2 FOR N=30000 TO 30139
  3 READ A: POKE N,A
  4 LET COUNT=COUNT+A
  5 NEXT N
  6 IF COUNT<>15546 THEN GO TO
60
  9 GO TO 100
 60 CLS : PRINT AT 10,7; FLASH
1; "ERROR IN DATA": BEEP 1,20: S
TOP
 100 CLS : PRINT AT 10,2; PAPER
2; INK 7; FLASH 1; "LOADING OK"
 110 PRINT AT 18,4; PAPER 6; INK
0; "TO RUN ";
 120 PRINT AT 14,5; FLASH 1; INV
ERSE 1; "RANDOMISE USR 30000"
 130 NEXT N
1000 DATA 33,64,255,17,0,24,64,0,
35,11,120,177,32,248,62,252,33,0
,64,17,64,255,6,32,203,46,126,43
,203,203,254,235,203,78,40,4,235
,203,46,235,203,26,40,4,235,203,
28,235,203,91,40,4,
1010 DATA 235,201,230,236,223,16
0,40,4,235,201,238,235,203,116,1
0,235,203,116,235,203,126,16,1,
,235,235,205,235,203,126,40,4,23
5,203,166,235,43,19,6,185,61,40
1020 DATA 0,6,84,30,16,253,195,7
0,117,33,95,150,17,0,88,12,14,5,
32,86,119,9,41,16,38,50,16,0,195
,0,150,42,41,16,229,17,0,8,
4,1,235,26,237,176,201
```

SOUND OFF

This is a short program written on a BBC 1.2 O.S which is extremely useful when playing games late at night. Load beforehand and then press @ to disable the sound or P to bring it back — even when the game is in progress. It works on Planetoid, Killer Gorilla, Snapper, Hopper and hopefully all games not using &A00-&AFF.

Type in the program. Run it to assemble then *Save "name" A00 A41. To use *Load, CALL &A00 then load your game as normal. Press @ when your mother tells you to turn it off and P when she's gone back to sleep.

T. J. Powell.

```
10P%=&A00
20[
30.LDA#7:JSR&FFEE
40.LDX#2:LDA#14:JSR&FFF4
50.LDA#&19 STA&22E:LDA#&0A:STA&221
60RTS:.BRK CLD
70PHA.TXA PHA:TYA:PHA:PHP
80CMP#64:BNE &A2D
90.LDX#9:LDY#7:LDA#&D2:JSR&FFF4
100CMP#B0:BNE &A3A
110.LDX#1:LDY#1:LDA#&D2:JSR&FFF4
120PLP PLA TAY:PLA:TAX:PLA:RTS
130]
```

RESPONSE Frame

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

IS ACE OK?

■ I have recently been offered a secondhand Jupiter Ace for £25. Should I buy it? I would like to learn Forth and this seems as good a way as any to make a start. Is it possible to still buy software and peripherals for the Ace?

L. Quintran,
London E9.

IT IS MUCH more convenient to use the Ace than to have to load in a Forth from tape every time you wish to work with the language, so it seems a worthwhile purchase in order to help you learn Forth.

A L Rogers informs me that Boldfield Computing Ltd., Sussex House, Hobson Street, Cambridge — telephone Romsey (0487) 840740 — currently sell the Ace, and have produced 11 original software packages for it. They also sell the original 16K pack, and also a 48K Ram as well as an add on keyboard.

RANDOM NUMBERS

■ Could you please tell me how to simulate a random number function in machine code on my Commodore computer?

Hans-Erik Floyd,
Filipstad,
Sweden.

THIS IS far from simple to do. You could call the random number routine in the Basic Rom when you need a number, or store a set of random numbers — called from the Rom routine — and then access them as you need them. Another way, which would be a bit of a "fudge" but will work well in practice, is to get the random numbers you need while you are still in Basic, before you go into machine code.

That is, you set up a table of random numbers — as many as you will need in the program — and then Poke them into memory, before executing the SYS command to go into machine code. These numbers can then be accessed as and when they are required during the running of the program.

GAME CHALLENGE

■ I own a Vic-20 with 16K expansion. I like adventure programs, but have found little challenge in most of those I have tried. Those I own include *Dungeons, the Dark Dungeons, Mysterious Island* and *The Curse of the Werewolf*. This last one was the only game which I found hard to do, and it took me several weeks to get in and around the castle. Could you please recommend another adventure game which is harder to crack that most others, and keeps you wanting more. I do not mind if it is text or graphics?

M. Butterworth,
Bacup,
Lancashire.

THE SCOTT ADAMS adventures, such as the very tricky *Voodoo Castle*, have proved very popular. They are difficult programs to solve. They also have the advantage of having "skill levels" printed on the packaging, so you can choose programs of a difficulty level which suits you.

8-BIT MICROS

■ Most home computers use an 8-bit processor, yet many of these have 64K memories, which would demand 'it seems to me' 16 bits — two raised to the 16th power equals 64K. How can an 8-bit computer address this amount of memory?

I.C. Bishop,
Ely,
Cardiff.

AN 8-BIT computer *transfers* data 8 bits at a time. This has nothing to do with how much memory the computer can address. The addressable memory is limited by the *address bus* which, on an 8-bit computer, is 16 bits wide, thus allowing it to address 64K.

CORRUPTION

■ I very often design my own title pages for programs listed in computer books, but I am experiencing a little problem. To brighten up the display, I use:

POKE 645,RND(1)*6

to produce a flashing effect. But when I use this with a program which contains sprites and graphics, the program works but the graphics are corrupted. Could you possibly suggest a way I could overcome this problem?

J A Quintin,
Norwich.

THE POKE YOU are using simply changes the colour of the cursor — and therefore changes, character by character, the colour of the material you're printing in text on the screen. However, I cannot see how Poking this address could possibly "corrupt" other graphics.

The best way to isolate the problem would be to do your random colour changes by having the colour controls within a string, a section of which is selected at random — using Mid$ — and print it before each character is printed. If your corruption still occurs, it could well be a machine fault.

KEY TO ACCESS

■ I would like to know how to access more than one key at a time on the Commodore 64. I am writing a machine-code polyphonic organ program, and I cannot find any literature which will enable me to play chords. Can you help?

L Meek,
Garrowhill,
Glasgow.

UNFORTUNATELY, IF you press two keys at once on the 64, the computer will only read the one with the highest priority. There are only three keys which return values at the same time as other keys are being read. These are the Control, Shift and Commodore keys. The state of these keys is held in location 653.

If Shift is pressed

PEEK(653) AND 1

will return 1 — 0 if not pressed; if Control is pressed

PEEK(653) AND 2

will return 2; and if the Commodore key is held down

PEEK(653) AND 4

will return 4.

PEEK(653) AND 7

will test all three.

MORE RAM ROOM

■ I have a BBC Micro with a disc interface attached. I have written several programs which just about cause it to run out of memory. I am afraid that if I try to develop them further, I definitely will run out of Ram. Is there a way of "disconnecting" the interface, using software, to free up the most possible room for my programs?

David Johansor,
London W4.

IF YOU type in:

PAGE=&1200

you'll find you get an additional 1.75K. Although you can still use your disc system, your *cannot* open disc files — that is, you cannot use the Openin command.

SOFTWARE File

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Klondike

Brian Fitton,
Bradford,
West Yorkshire.

Spectrum

THIS IS the story of Klondike Bill — you take his part. Bill has arrived in the small town of Fittsville in the Middle West in response to stories of a Gold Strike. He finds himself a plot of land that he can prospect on.

You move him about with the cursor keys 5, 6, 7, 8 and when you decide which square to mine press S. The program will respond by telling you whether there is gold there or not; if there is you have a choice, mining it or not. The screen then changes to show the level indicators which show your current status and at the bottom of the screen a pointer which traverses left and right by means of the cursor keys 5 and 8 and points to a type of icon instead of the more usual menu.

You must ensure that the Energy level is kept high, the fatigue level low, the Food level high, and the hunger level low.

You may convert gold to cash any time, and you may also buy food providing you have enough cash to do so.

The variables for the initial levels are held in line 35 and can be altered as you wish, they are a=Fatigue, b=Food, c=Cash, d=Energy, e=Gold, f=Hunger.

The graphic characters are as follows:

LINE 75 "AC" "BD" "EG" "FH". LINE 365 Each one is shifted graphic three twice. LINE 450 is "N". LINE 475 is "K" "I" "J" "L" "M" "O". Line 480 is shifted Graphic 8. LINE 690 are unshifted Graphic 3 eight times, shifted Graphic 5, unshifted Graphic 5 and shifted Graphic 3 eight times. LINE 710 is the same +1 LINE 900 is "AC" "BD" "EG" "FO". LINE 910 is "AC" "BD" "EG" "PH".

```
  0 REM © Brian Fitton 13/4/85
           211 LYNFIELD DRIVE
           HAWORTH ROAD
           BRADFORD BD9 6FY
  1 CLEAR 65366: POKE 23658,8
FOR z=0 TO 6: PRINT AT z,8; INK
2;"K L O N D I K E": BEEP .05,-2
0: NEXT z: FOR z=7 TO 14: PRINT
AT z,9; INK 3; BRIGHT 1;"STOP TH
E TAPE": BEEP .05,-25: NEXT z: F
OR z=15 TO 21: PRINT AT z,8; INK
 2;"K L O N D I K E": BEEP .06,-
30: NEXT z
  2 FOR z=0 TO 300: NEXT z: CLS
: PRINT AT 10,1;"DO YOU WANT IN
STRUCTIONS (Y/N)?": PAUSE 0
  3 IF INKEY$="Y" THEN GO TO 5
  4 IF INKEY$="N" THEN GO TO 17
  5 CLS : LET Q$="            INS
TRUCTIONS": GO SUB 790: PLOT 78,
167: DRAW 100,0: FOR z=0 TO 300:
 NEXT z: CLS
  6 LET Q$="  This is the story
 of Klondike  Bill. You take the
 part of he.  Bill has arrived i
n the small   town of Fittsville
 in the       middle west in res
ponse to      tales of a Gold St
rike, and     finds himself a pl
ot of land    that he can Prospe
ct on.": GO SUB 790
  7 LET Q$="           You move Kl
ondike Bill around  the screen
by the cursor keys  5,6,7 & 8 a
nd select a square  which you t
hink may be worth   mining, the
n press 'S' the     program wil
l respond by telling you wether
their is Gold there  or not, you
 then have a choice  of mining o
r not.      You are then presen
ted with the Level   Indicaters
which show your      Current Sta
tus and at the       bottom of t
he screen a type of  Icon in pla
ce of a Menu.": GO SUB 790
  8 PRINT #1;"   Press any key
to Continue": PAUSE 0
  9 CLS : LET Q$=" Follow the I
nstuctions given at the bottom o
f the Screen i.e.   use key 5 to
 move the pointer   to the left
and key 8 to the    right, 'S' a
gain selects your   choice.
                    You must ens
ure that the Energy level is kep
t high, the Fatigue level is kep
t low, the Food     level is kep
t high, and the     Hunger level
 is kept low.       The other tw
o levils are Gold   and Cash. Yo
u may convert any   Gold you fin
d into cash at any  time. You ar
e also able to buy  food providi
ng you have enough  cash to do s
o.": GO SUB 790
 10 LET Q$="
                 GOOD LUCK": GO SUB
 790: PRINT AT 20,3;"PRESS ANY K
EY TO BEGIN OR 'I'   TO READ INS
TRUCTIONS AGAIN": PAUSE 0: IF IN
KEY$="I" THEN GO TO 5
 18 RESTORE : FOR y=USR "a" TO
USR "p"+7: READ x: POKE y,x: NEX
T y
 19 DATA 127,255,225,192,156,13
0,217,201,193,129,128,64,57,65,3
2,30,254,255,135,3,57,65,155,147
,131,129,1,2,194,130,4,6
 20 DATA 108,131,129,161,161,16
1,31,30,127,127,63,60,60,60,28,1
26,62,193,129,133,133,133,138,13
8,254,254,252,60,60,60,56,126
 25 DATA 169,171,251,35,35,33,3
5,35,128,192,224,254,254,130,130
,0,96,112,60,124,100,100,30,72,1
6,108,130,186,162,186,130,124,6
 30 DATA 8,16,40,68,63,63,40,24
,16,56,124,254,124,56,56,56,252,
252,60,126,0,0,0,0,63,63,30,126,
0,0,0,0
 35 LET aa=6: LET bb=13: LET a=
0: LET b=10: LET c=25: LET d=100
: LET e=0: LET f=0: LET dd=19: L
ET ee=13
 40 LET j=a: LET k=b: LET l=c:
LET m=d: LET n=e: LET o=f
 45 BORDER 3: PAPER 6: INK 0: B
RIGHT 1: CLS
 50 PLOT 0,0: DRAW 0,175: DRAW
255,0: DRAW 0,-175
 55 PRINT INK 1; INVERSE 1;AT 2
0,0;"* * * * * * * * * * * * * *
": INVERSE 0: BRIGHT 0;AT 20,28
;"    "
 60 PRINT INK 1; INVERSE 1;AT 2
1,0;" Cursor Keys Move-S Selects
 "; INVERSE 0; BRIGHT 0;AT 21,28
;"    "
 65 FOR z=0 TO 19: PRINT AT z,2
8; BRIGHT 0;"    ": NEXT z
 70 LET q=0: FOR g=q TO 200 STE
P 32: FOR p=175 TO 32 STEP -32:
PLOT g,p: DRAW q,-32: DRAW 32,q:
 DRAW -32,q: DRAW q,32: DRAW 32,
q: DRAW q,-32: NEXT p: NEXT g
 75 PRINT INK 2;AT aa,bb;"AC";A
T aa+1,bb;"BD"; INK 8;AT aa+2,bb
;"EG"; INK 1;AT aa+3,bb;"FH"
 76 GO SUB 900: FOR z=0 TO 5: N
EXT z: GO SUB 910
 80 IF INKEY$="5" THEN GO SUB 9
00: GO SUB 910: LET bb=bb-4: PRI
NT AT aa,bb+4;"  ";AT aa+1,bb+4
;"  ";AT aa+2,bb+4;"  ";AT aa+
3,bb+4;"  ": IF bb<=1 THEN LET
bb=1
 85 IF INKEY$="8" THEN GO SUB 9
10: GO SUB 900: LET bb=bb+4: PRI
NT AT aa,bb-4;"  ";AT aa+1,bb-4;
"  ";AT aa+2,bb-4;"  ";AT aa+3,b
b-4;"  ": IF bb>=25 THEN LET bb=
25
 90 IF INKEY$="7" THEN GO SUB 9
00: GO SUB 910: LET aa=aa-4: PRI
NT AT aa+4,bb;"  ";AT aa+5,bb;"
  ";AT aa+6,bb;"  ";AT aa+7,bb;"
  ": IF aa<=0 THEN LET aa=0
 95 IF INKEY$="6" THEN GO SUB 9
00: GO SUB 910: LET aa=aa+4: PRI
NT AT aa-1,bb;"  ";AT aa-2,bb;"
  ";AT aa-3,bb;"  ";AT aa-4,bb;"
  ": IF aa>=16 THEN LET aa=16
 100 IF INKEY$="S" THEN GO TO 11
0
 105 GO TO 75
 110 CLS : FOR z=0 TO 9: PRINT P
APER 5;"
                ": NEXT z: INK 3: LET Q$
="        S E A R C H I N G
   ": GO SUB 790
 115 BORDER 3: PAPER 6: INK 0: C
LS : PRINT INK 3; INVERSE 1; FLA
SH 1;AT 10,0;"        S E A R C H
 I N G          "
 120 PAUSE 100: GO SUB 585
 125 IF c<=-15 THEN LET c=0: LET
 l=7
 130 BORDER 6: CLS : LET f=f+1
 135 IF a<=0 THEN LET a=1
 140 IF a>=0 THEN LET j=9
 145 IF f<=0 THEN LET f=1
 150 IF d<=0 THEN LET m=10
 155 IF b<=10 THEN LET k=10
 160 IF c>=15 THEN LET l=10
 165 IF d<=90 THEN LET m=1
 170 IF e<=10 THEN LET n=10
 175 IF f>=1 THEN LET o=0
 180 IF a>=10 THEN LET j=2
 185 IF b<=8 THEN LET k=2
 190 IF c>=140 THEN LET l=8
 195 IF d<=80 THEN LET m=8
 200 IF e>=30 THEN LET n=8
 205 IF f>=3 THEN LET o=7
 210 IF a>=30 THEN LET j=4
 215 IF b<=6 THEN LET k=6
 220 IF c>=300 THEN LET l=6
 225 IF d<=60 THEN LET m=6
 230 IF e>=60 THEN LET n=7
 235 IF f>=5 THEN LET o=5
 240 IF a>=60 THEN LET j=6
 245 IF b<=4 THEN LET k=8
 250 IF c>=500 THEN LET l=5
 255 IF d<=40 THEN LET m=4
 260 IF e>=90 THEN LET n=6
 265 IF f>=6 THEN LET o=3
 270 IF b<=2 THEN LET k=1
 275 IF d<=10 THEN LET m=9
 280 IF a>=150 THEN LET j=1
 285 IF e>=500 THEN LET n=1
 290 IF c>=5000 THEN LET l=1
 295 IF b=0 THEN LET Q$=" YOU HA
VE RUN SHORT OF FOOD !!!!": GO S
UB 790: FOR z=0 TO 200: NEXT z:
GO TO 735
 300 PRINT AT 0,1;"E";AT 1,1;"N"
;AT 2,1;"E";AT 3,1;"R";AT 4,1;"G
";AT 5,1;"Y"
 305 PRINT AT 0,6;"F";AT 1,6;"A"
;AT 2,6;"T";AT 3,6;"I";AT 4,6;"G
";AT 5,6;"U";AT 6,6;"E"
 310 PRINT AT 0,11;"G";AT 1,11;"
O";AT 2,11;"L";AT 3,11;"D"
 315 PRINT AT 0,16;"C";AT 1,16;"
A";AT 2,16;"S";AT 3,16;"H"
 320 PRINT AT 0,21;"F";AT 1,21;"
O";AT 2,21;"O";AT 3,21;"D"
 325 PRINT AT 0,26;"H";AT 1,26;"
U";AT 2,26;"N";AT 3,26;"G";AT 4,
26;"E";AT 5,26;"R"
 330 PRINT OVER 1;AT 11,2;d;AT 1
1,7;a;AT 11,11;INT e;AT 11,16;c;
AT 11,22;b;AT 11,28;f
 335 PLOT 6,78: DRAW 0,96
 340 PLOT 46,78: DRAW 0,96
 345 PLOT 86,78: DRAW 0,96
 350 PLOT 126,78: DRAW 0,96
 355 PLOT 166,78: DRAW 0,96
 360 PLOT 206,78: DRAW 0,96
 365 PRINT INK 1;AT m,2;"▬▬"; IN
K 2;AT j,8;"▬▬"; INK 4;AT n,13;"
▬▬"; INK 0;AT l,18;"▬▬"; INK 5;A
T k,23;"▬▬"; INK 3;AT o,28;"▬▬"
 370 PLOT 6,78: DRAW 240,0: DRAW
 0,96
 375 IF c<=0 THEN CLS : FOR z=0
TO 10: PRINT PAPER 6;"
                ": NEXT z
: LET Q$="UNFORTUNATELY YOU HAVE
NO CASH  ": GO SUB 790: FOR z=0
TO 200: NEXT z: GO TO 735
 380 IF a>=100 THEN PAUSE 100: C
LS : PRINT : PRINT : PRINT : LET
 Q$="YOU ARE TOO FATIGUED TO CON
TINUE": GO SUB 790: FOR z=0 TO 2
00: NEXT z: GO TO 735
 385 IF d<=0 THEN PAUSE 100: CLS
 : PRINT : PRINT : PRINT : LET Q
$=" YOU HAVE NO ENERGY TO CONTIN
UE ": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 390 IF e>=9999 THEN PAUSE 100:
CLS : PRINT : PRINT : PRINT : LE
T Q$=" YOU HAVE MORE THAN ENOUGH
 GOLD    LET SOMEONE ELSE HAVE A
 GO": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 395 IF c>=9999 THEN PAUSE 100:
CLS : PRINT : PRINT : PRINT : LE
T Q$=" YOU HAVE MORE THAN ENOUGH
 CASH    LET SOMEONE ELSE HAVE A
 GO": GO SUB 790: FOR z=0 TO 200
: NEXT z: GO TO 735
 400 IF f>=10 THEN PAUSE 100: CL
S : PRINT : PRINT : PRINT : LET
Q$=" YOU HAVE ALLOWED YOUR HUNGE
R      TO REACH TOO HIGH A LEVEL
    ": GO SUB 790: FOR z=0 TO 20
0: NEXT z: GO TO 735
 405 PRINT INK 1; BRIGHT 1; INVE
RSE 1;AT 13,1;"L E V E L   I N D
I C A T O R S"
 410 PRINT AT 15,1;"Mine";AT 15,
6;"Eat";AT 15,11;"Rest";AT 15,16
;"Buy";AT 15,21;"G-C";AT 15,26;"
End"
 415 PRINT INK 3;AT 21,0;"  <<5
  'S' Selects       8>>>"
 420 PLOT 5,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
 425 PLOT 45,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
 430 PLOT 85,41: DRAW 30,0: DRAW
-15,-15: DRAW -15,15
```

```
 435 PLOT 125,41: DRAW 30,0: DRA
J -15,-15: DRAW -15,15
 440 PLOT 165,41: DRAW 30,0: DRA
J -15,-15: DRAW -15,15
 445 PLOT 205,41: DRAW 30,0: DRA
J -15,-15: DRAW -15,15
 450 PRINT INK 3;AT dd,ee;"N"
 455 IF INKEY$="5" THEN LET ee=e
e-1: PRINT AT cd,ee+1;" ": IF ee
<=2 THEN LET ee=2
 460 IF INKEY$="8" THEN LET ee=e
e+1: PRINT AT cd,ee-1;" ": IF ee
>=27 THEN LET ee=27
 465 IF INKEY$="5" THEN GO TO 46
0
 470 PLOT 8,15: DRAW INK 3;230,2
 475 PRINT AT 17,2;"S";AT 17,7;"
I";AT 17,12;"U";AT 17,17;"L";AT
17,22;"M";AT 17,27;"O"
 480 PRINT INK 3;AT 19,1;"▐";AT
19,29;"▐"
 485 BEEP .02,RND+30: GO TO 450
 490 IF ee<18 THEN RESTORE : LET
ee=15: GO TO 45
 495 IF ee<=7 THEN LET ee=15: GO
TO 525
 500 IF ee<=12 THEN LET ee=15: G
O TO 710
 501 IF ee<=13 AND ee<=15 THEN G
O TO 450
 505 IF ee<=17 THEN LET ee=15: G
O TO 795
 510 IF ee<=22 THEN LET ee=15: G
O TO 795
 515 IF ee<=27 THEN LET ee=15: G
O TO 825
 520 BEEP .02,RND:30: GO TO 450
 525 LET r=INT (RND*13)
 530 IF r<=5 THEN GO TO 550
 535 CLS : FOR z=0 TO 9: PRINT P
APER 6;"
": NEXT z: LET O$="
FOOD O.K. NICE MEAL": GO SUB 79
0: FOR z=0 TO 100: NEXT z
 540 LET f=f-3: LET b=b-1: LET a
=a-15
 545 GO TO 130
 550 CLS : FOR z=0 TO 9: PRINT P
APER 6;"
": NEXT z: LET O$="
FOOD IS BAD TRY AGAIN": GO SUB 7
90
 555 FOR z=0 TO 100: NEXT z: LET
b=b-1: GO TO 130
 560 LET r=INT (RND*10)
 565 FOR z=0 TO 100: NEXT z
 570 IF r<=6 THEN GO TO 585
 575 LET a=a+15: LET d=d-5
 580 GO TO 130
 585 LET r=INT (RND*10)
 590 IF r<=4 THEN GO TO 610
 595 CLS : FOR z=0 TO 10: PRINT
PAPER 5;"
": NEXT z: LET O$="
BAD LUCK NO GOLD HERE
      TRY AGAIN": GO SUB 790
 600 FOR z=0 TO 100: NEXT z
 605 LET a=a+15: LET d=d-10: GO
TO 130
 610 LET i=INT (RND*40)
 615 LET g=INT (RND*[illegible])
 620 LET h=INT (RND*60)+aa-bb
 625 CLS : PRINT : PRINT INK 3;
LET C$="      CONGRATULATION'S
!!
": GO SUB 790: INK 0: PR
INT : PRINT : LET O$=" You have
Discovered some Gold": GO SUB 7
90
 630 PRINT AT 8,2;" Quantity :";
h;" Ounces"
 635 PRINT AT 10,2;" Quality  :"
 640 IF g>1 AND g<5 THEN PRINT A
T 10,19;g;" Poor"
 645 IF g>9 AND g<20 THEN PRINT
AT 10,19;g;" Very Good"
 650 IF g>=20 THEN PRINT AT 10,1
9;g;" Rich Seam"
 655 IF g<=1 THEN PRINT AT 10,19
;g;" Very Poor"
 660 PRINT : PRINT : PRINT : LET
O$=" Difficulty level :": G
O SUB 790: PRINT AT 14,23;i;24;g
 665 PRINT : PRINT : LET O$=" DO
YOU WISH TO MINE HERE (Y/N)?":
GO SUB 790
 670 PAUSE 0
 675 IF INKEY$="Y" THEN GO TO 69
0
 685 LET a=a+10: LET d=d-10: GO
TO 130
 690 CLS : PRINT INK 2;AT 8,10;"
MINING": INK 7;AT 8,12;"▐▐▐
```

(continued from previous page)

```
G A M E   O V E R          "
 570 RANDOMIZE USR 32520
 580 RANDOMIZE USR 32542: RANDOM
IZE USR 32569
 590 INPUT "Press ENTER for anot
her go ";z$
 600 IF z$="" THEN RESTORE 660:
GO TO 20
 610 STOP
 620 FOR y=56 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT a6,e;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 630 FOR y=88 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ad,e;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,56: RE
TURN
 640 FOR y=80 TO 60 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ac,e;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,68: RE
TURN
 650 FOR y=68 TO 80 STEP -1: POK
E 23675,y: PRINT INK 3; PAPER 6;
AT ab,e;CHR$ 148: RANDOMIZE USR
32663: NEXT y: POKE 23675,88: RE
TURN
 660 RANDOMIZE USR 32569: PRINT
AT 2,4;"B A T T L E G R O U N D"
;AT 4,6;"© Brian Fitton 1985"
 670 PLOT 30,130: DRAW 188,0: DR
AW 0,34: DRAW -188,0: DRAW 0,-34
 680 PLOT 30,100: DRAW 188,0: DR
AW 0,-70: DRAW -188,0: DRAW 0,70
 690 PRINT AT 10,4;"Keys are:";
AT 12,7;"Z moves gun Left";AT 14
,7;"X moves gun Right";AT 16,7;"
SPACE BAR to fire"
 700 PLOT 30,100: DRAW 188,0: DR
AW 0,14: DRAW -188,0: DRAW 0,-14
 710 PLOT 30,10: DRAW 188,0: DRA
W 0,14: DRAW -188,0: DRAW 0,-14
 720 FOR a=0 TO 7: READ b: POKE
USR "a"+a,b: NEXT a
 730 FOR a=0 TO 7: READ b: POKE
USR "b"+a,b: NEXT a
 740 FOR a=0 TO 7: READ b: POKE
USR "c"+a,b: NEXT a
 750 FOR a=0 TO 7: READ b: POKE
USR "d"+a,b: NEXT a
 760 FOR a=0 TO 7: READ b: POKE
USR "e"+a,b: NEXT a
 770 FOR a=0 TO 7: READ b: POKE
USR "f"+a,b: NEXT a
 780 FOR a=0 TO 7: READ b: POKE
USR "g"+a,b: NEXT a
 790 FOR a=0 TO 7: READ b: POKE
USR "h"+a,b: NEXT a
 800 FOR a=0 TO 7: READ b: POKE
USR "i"+a,b: NEXT a
 810 FOR a=0 TO 7: READ b: POKE
USR "j"+a,b: NEXT a
 820 FOR a=0 TO 7: READ b: POKE
USR "k"+a,b: NEXT a
 830 FOR a=0 TO 7: READ b: POKE
USR "l"+a,b: NEXT a
 840 DATA 57,122,20,124,124,108,
40,108
 850 DATA 56,40,40,40,40,40,68,6
8,68,68,68,68,130,130,130,255
 860 DATA 0,0,0,0,0,0,0,0,57,68,
20,124,124,108,40,108
 870 DATA 63,31,15,0,0,0,0,0,255
,255,255,0,0,0,0,0,252,248,240,0
,0,0,0,0,0,0,0,0,112,34,34,255
 880 DATA 0,0,0,56,56,56,16,16
 890 DATA 0,0,24,44,60,24,0,0
 900 DATA 0,60,78,94,125,126,60,
0
 910 INPUT TAB 4;"SELECT LEVEL (
1 TO 5) ";h
 920 IF h<1 OR h>5 THEN GO TO 91
0
 930 CLS : LET sc=0
 940 LET a$="A A A A A A A A A A
"
 950 LET b$="A A A A A A A A A A
"
 960 LET c$="A A A A A A A A A A
"
 970 LET d$="A A A A A A A A A A
"
 980 LET f$=" I          I
I            FGH        FGH       F
GH "
 990 LET bc=0: IF sc>0 AND h<10
THEN LET h=h+10
1000 LET vb=0: LET ab=2: LET ac=
4: LET ad=6: LET ae=8: LET af=0
1010 LET o=0: LET y=0: LET x=0
LET m=31: LET s=0
1020 LET t=0: LET n=0: LET q=0
1030 LET e$=""
1040 LET nm=0: LET l=3: LET a=15
1050 RANDOMIZE USR 32542: RETURN

1060 FOR y=80 TO 88 STEP 2: POKE
 23675,y: PRINT INK INT (RND+4);
 PAPER 6;AT ab,a;a$;AT ac,a;b$;A
T ad,a;c$;AT ae,a;d$: RANDOMIZE
USR 32663: NEXT y: POKE 23675,88
: RETURN
```

The hex loader.

Listing 2.

```
  10 DEF FN h(h$)=16*(CODE h$(1)
-48-(7 AND h$(1)>"9"))+CODE h$(2
)-48-(7 AND h$(2)>"9")
  20 INPUT "Start ";s
  30 INPUT "Finish ";f
  40 FOR n=s TO f STEP 8
  50 LET tot=0: PRINT n;": ";
  60 INPUT h$: PRINT h$;
  70 LET x=0
  80 FOR b=1 TO LEN h$ STEP 2
  90 LET z=FN h(h$): LET tot=tot
+z
 100 POKE n+x,z
 110 LET h$=h$(3 TO ): LET x=x+1
 120 NEXT b
 130 PRINT " = ";: INPUT t: PRIN
T t
 140 IF tot<>t THEN PRINT "input
 error - try again": GO TO 50
 150 NEXT n
 160 REM enter STOP to stop
```

The machine code.

```
32448: 3E3E0521FF571100 = 524
32507: 880100037EDB031 = 684
32515: FE7F20EF0968280E = 913
32523: FD0000FE30FE14 = 1126
32531: 20F60D7920F30573 = 815
32539: 20ED0210C0321E2 = 607
32547: 01110100E5D5C5CD = 360
32555: D3C0C1D1E1E3D3D8 = 800
32563: 78FE0020EFC9015E = 941
32571: 0121900111C302E5 = 429
32579: C5CDB52301E12308 = 1050
32587: 78FE00200EF015E01 = 741
32595: 110300C5F5CD5503 = 835
32603: E1C10B2F78FE0020 = 878
32611: EFC9110100010000 = 459
32619: 2600A5F5C5C5CD = 1003
32627: B5C3C1D1E10378FE = 1188
32635: 0720EFC9C1F40121 = 756
32643: 2C0111010CE5C5CD = 694
32651: B5C3C1E1E3CB7C7E = 1022
32659: 0020EFC9017F0021 = 633
32667: AA0011010CD5C5E5 = 827
32675: CDB5C3E1C1D1D3D3 = 1054
32683: 2323011AFE0120EE = 616
32691: C9000000000000000 = 201
```

Boxing

Jason Freer,
Ramsgate,
Kent.

CBM-64

THE PROGRAM offers you a bird's eye view of a boxing ring and the opportunity to go through three rounds with an opponent of your choice is possible if your strategy's slick enough. The keys for the game are X is for down and Z is for up. The > key is for moving right and the < key is for moving left.

The CBM key is for punching with the left hand and the Shift key is for punching with the right hand. Please note that this game is for the Commodore 64 computer and has sound and 10 levels of play. This program has instructions with it.

```
0 POKE53281,7:POKE53280,21
1 PRINT"■":PRINT"■"TAB(15)"■WELC
OME TO"
2 PRINT"■■■■■"TAB(6)"■■ ■■ ■■ ■■
■■ ■■ ■■ ■■ ■■ ■■ ■■ 
```

```
7510 PRINT"▯          ▯▯▯ ▯▯▯ ▯▯▯ ▯▯▯
▯▯▯ ▯▯ ▯▯ ▯▯ ▯▯ ▯▯▯ ▯▯▯ ▯▯▯ ▯▯▯ P"
7515 PRINT"▯                    B O X
I N G "
7520 PRINT"▯▯▯  SO YOU WANT TO BE
 A CHAMPION DO YOU?"
7522 PRINT"▯  IF SO THEN THIS IS
 THE GAME FOR YOU"
7524 PRINT"▯  WHICH OPPONENT DO
YOU WISH TO FIGHT
     FIRST?"
7530 FORF=1TO10 READA$:PRINTF"..
.";:IFF<>10THENPRINT",";
7535 PRINTA$:B$(F)=A$:NEXTF
7540 INPUTXX:IFXX<1ORXX>10THENPR
INT"▯▯▯".GOTO7540
7545 SK=(11-XX)/12
7546 K2=10+XX+INT(RND(1)*6):K1=1
6-XX+INT(RND(1)*10)
7550 B$=LEFT$(B$(XX),6)
7560 PRINT"▯":PRINT"▯     WERY W
ELL,YOUR OPPONENT WILL BE▯":PRIN
TTAB(14)B$(XX)
7562 PRINT"▯▯ EACH BOUT YOU FIGH
T IS ONLY 3 ROUNDS"
7564 PRINT"▯ MOVE ABOUT THE RING
 WITH▯ X Z AND <>";
7566 PRINT"▯     ▯▯▯▯▯(LEFT HAND
) ▯SHIFT ▯(RIGHT HAND)"
7568 PRINT"▯NOTE THAT YOU CAN MO
VE AND PUNCH AT THE":PRINT"▯ SAM
E TIME.▯"
7570 PRINT"▯ONLY PUNCHES TO THE
HEAD SCORE.":PRINT"▯▯KNOCK-OUTS
ARE POSSIBLE"
7575 GOSUB9000
7580 PRINT"▯▯PRESS ANY KEY TO ST
ART THE▯ BOUT"
7590 GETX$:IFX$=""THEN7580
7595 RETURN
8500 REM * END OF ROUND *
8505 PRINT"▯▯▯▯▯▯"TAB(29)" B : B
B  "
8510 POKESB+4,21
8520 POKE2040,192:POKE2041,195
8530 FORT=1TO500:NEXT:POKESB+4,2
B
8540 X=X+4*(X>32):Y=Y+4*(Y>60):F
=F-4*(F<224):G=G-4*(G<220)
8550 POKEV,X:POKEV+1,Y
8560 POKEV+2,F:POKEV+3,G
8565 POKE2040,192:POKE2041,195-
8570 IFX<=32ANDY<=60ANDF>=224AND
G>=220THEN8580
8575 GOTO8540
8580 ROUND=ROUND+1:IFROUND=4THEN
ROUND=3:GOTO6620
8585 POKESB+15,19:FORT=1TO16:POK
ESB+4,21
8590 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯"TAB(7)"PRE
PARE TO FIGHT":PRINTTAB(7)" THE
NEXT ROUND "
8595 FORDL=1TO200:NEXTDL:POKESB+
4,20
8600 PRINT"▯▯▯▯▯▯▯▯▯▯▯▯"TAB(7)"
                ":PRINTTAB(7)"
                "
8605 FORDL=1TO200:NEXTDL
8610 NEXTT
8620 GOTO62
9000 REM*READ IN SPRITE DATA HER
E*
9010 FORT=0TO511:READA:POKE192*6
4+T,A:NEXTT
9100 POKE2040,192:POKE2041,195:P
OKEV+39,0:POKEV+46,7
9400 RETURN
9500 REM * DRAW THE RING *
9510 AA$="%":BB$=AA$
9520 FORT=1TO27:AF$=AA$+"%":BB$=
BB$+" ":NEXTT
9530 PRINT"▯"TAB(8)"POINTS"TAB(1
6)"POINTS"TAB(32)"TIME"
9535 AA$=AA$+"%":EB$=BB$-"%"
9540 PRINT"▯"AA$:FORT=0TO22:PRIN
TBB$:NEXTT:PRINTAA$;
9600 PRINT"▯"SPC(152)"TIME"SPC(1
98)"ROUND"SPC(198)"POINTS"SPC(35
)LEFT$(C$,6)
9605 PRINT"▯▯▯▯"TAB(32)LEFT$(A$(
XX),6)
9650 RETURN
20010 REM *** SPRITE BOXER-LEFT
***
20012 DATA0,56,0,0,127,252,0,127
,254,0,167,2
20013 DATA0,127,2,0,56,63,0,0,12
7,0,0,127
20014 DATA0,0,99,0,0,65,0,0,0,0,
0,0
20015 DATA0,0,65,0,0,99,0,0,127,
0,56,127
20016 DATA0,127,63,0,127,2,0,127
,254,0,127,252
20017 DATA0,56,0,0
20020 REM***SPRITE LEFT-PUNCH R*
**
20021 DATA112,0,0,255,255,252,25
5,255,254,254,0,2
20023 DATA254,0,18,112,0,62,0,0,
127,0,0,99
20024 DATA0,0,65,0,0,65,0,0,1,0,
0,65
20025 DATA0,0,65,0,0,99,0,0,126,
0,56,62
20026 DATA0,127,18,0,127,2,0,127
,254,0,127,252
20027 DATA0,56,0,0
20030 REM***SPRITE LEFT-PUNCH LEF
T**
20032 DATA0,56,0,0,127,252,0,127
,254,0,127,2
20033 DATA0,127,18,0,56,62,0,3,1
27,0,0,99
20034 DATA0,0,65,0,0,65,0,0,1,0,
0,65
20035 DATA0,0,65,0,0,99,0,0,127,
112,0,62
20036 DATA254,0,18,254,0,2,255,2
55,254,255,255,252
20037 DATA112,0,0,0
20100 REM***SPRITE BOXER RIGHT **
*
20102 DATA0,56,0,63,252,0,127,25
2,0,65,252,0
20103 DATA73,252,0,124,56,0,126,
0,6,198,0,0
20104 DATA131,0,0,131,6,0,129,0,
0,131,0,0
20105 DATA171,0,0,130,6,0,254,0,
0,124,56,0
20106 DATA73,252,0,65,252,0,127,
252,0,63,252,0
20107 DATA0,56,0,0
20110 REM***SPRITE RIGHT-R PUNCH*
*
20112 DATA0,28,0,63,254,0,127,25
4,0,64,254,0
20113 DATA72,126,0,124,28,0,123,
3,0,198,0,0
20114 DATA131,0,0,130,0,0,129,3,
3,131,0,0
20115 DATA131,0,0,193,0,0,126,3,
3,124,0,14
20116 DATA72,0,63,64,0,127,123,2
55,255,63,255,255
20117 DATA0,0,14,0
20120 REM***SPRITE RIGHT-L PUNCH
**
20122 DATA0,0,14,63,255,255,127,
255,255,64,0,127
20123 DATA72,0,63,124,0,14,126,0
,0,198,0,0
20124 DATA131,0,0,130,0,0,129,3,
3,131,0,0
20125 DATA131,0,0,193,0,0,126,3,
3,124,28,0
20126 DATA72,126,0,64,254,0,127,
254,0,63,254,0
20127 DATA0,28,0,0
20130 REM*** SPRITE LOSER ***
20132 DATA0,0,0,0,0,24,0,0,24,3,
48,8
20133 DATA1,241,248,2,48,0,2,1,0
,2,1,0
20134 DATA115,253,0,251,255,0,25
5,254,0,255,254,0
20135 DATA251,255,0,115,252,123,
2,0,64,2,0,126
20136 DATA30,0,2,124,0,6,96,0,3,
3,0,0
20137 DATA3,0,0,0
20140 REM*** SPRITE WINNER ***
20142 DATA112,0,224,112,0,224,32
,240,64,33,240,64
20143 DATA35,198,64,35,108,64,35
,252,64,19,12,128
20144 DATA3,248,0,4,242,0,3,253,
3,3,252,0
20145 DATA3,252,0,1,248,0,0,240,
0,1,152,0
20146 DATA1,152,0,3,156,0,1,152,
0,13,155,0
20147 DATA15,159,0,0
```

Possessed

Guy Rowland,
Hextable,
Kent.

ZX-81

POSSESSED IS a game for the 16K ZX-81 written entirely in machine code. The game itself occupies under 1K, but uses the full display file which unfortunately means the Rampack has to be firmly placed on the back of the machine for the game to run. The idea of the game is loosely based on Robotron: you are a megabeing — or a 0 — running around shooting the robots — or Xs — and the highly technical idea behind it is to zap as many robots as possible before the last of your five lives deserts you. The game includes on screen scoring and a border indicating how many lives you have left.

The code is held in three Rem statements which should be the first three lines of the program. To begin, put the computer in fast mode, then type:

1 REM.....439 FULL STOPS OR ANY OTHER CHARACTERS.....

and then slow. When entered, Peek 16953 should give 118 if you have done this correctly. It it gives another number, add or delete characters as necessary. Next enter the short hex loader program in figure 1. This is the same as any normal hex loader, with two important additions:

- totals are entered at the start of each line of hex, and
- the END address is entered, so the computer stops automatically

If an error is made in entering any line of hex, instead of displaying the total, it will print E, and you must enter the total and hex again. So now enter the hex numbers and total in figure 2.

When you have finished this, alter the loader program so line 10 reads:

LET A=16959

and line 20 reads

LET D=17301

Next, type in a Rem statement at line 2, 343 characters long — which should return a value of 118 when 17302 is Peeked — and enter the hex in figure 3.

The final Rem statement is only 72 characters long, and should be line 3 of your program. Peek 17380 should give 118, and lines 10 and 20 of the loader should have the values 17308 and 17379. Enter the hex in figure 4, save the whole lot a couple of times just to make sure no mistakes have crept in, and type:

RAND USR 17308

Border will flash

After pressing Newline, a border will flash, several Xs and an 0 will appear, the screen will go dark for a second and the game will commence. If you are not touching any of the keys, you will start firing and moving up, and before long one of the robots will get you. To move your megabeing around, use the following control:

any key from Q to T for up
any key from Z to V for down
any key from A to G for left, and
any key from H to L for right

I find it easiest to use Q, Z, G and H, although you may prefer others. Since you fire automatically in the direction you are moving, there is no fire button, and diagonal movement is possible by pressing two keys at once.

When a whole screen of robots is cleared, a screen with more robots should appear. On average, each screen should have two or three more robots than the last, although occasionally you may find a higher sector has less than the one before.

If the game does not run correctly or crashes at some stage, reload the program from tape and enter the program in figure 4 substituting values for A and D depending on which Rem statement you are checking. When a screen is full of hex, press Cont to carry on where you left off. To alter the value of a byte, Poke the address with the correct value in decimal as a direct command. A hex/decimal conversion table is given in the Sinclair manual on page 181.

The game is available direct from the author for those who find the hex listing too hard. Please send £1.50 and a sae to Guy Rowland, Stonyacres, College Road, Hextable, Kent, BR8 7LT.

Figure 1.

```
  5 REM HEXLOADER
 10 PRINT "START ADDRESS"
 20 INPUT S
 30 PRINT "FINISH ADDRESS"
 40 INPUT F
 50 FOR N=S TO F STEP 8
 60 LET T=0
 70 PRINT N,":  ";
 80 INPUT A$
 90 PRINT A$," = ";
100 INPUT TOT
110 PRINT TOT
115 IF PEEK 16422=2 THEN SCROLL

120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+CO
DE A$(K+1)-28
150 LET T=T+C
160 POKE N+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
205 IF PEEK 16422=2 THEN SCROLL

210 GOTO 60
220 NEXT N
```

(continued from previous page)

Figure 2.

```
16514: 2A0C40CD85400616 = 564
16522: 111F002323771977 = 381
16530: 10F92306202377710 = 508
16538: FCD906143E80C5CD = 1071
16546: 8240C13CFE3A20F6 = 1117
16554: 10F23AA951CD8240 = 981
16562: 3D32A96179E5D52A = 1082
16570: 324053D29291929 = 435
16578: 2919ED5B34401922 = 569
16586: 32407DD1E1C92A0C = 523
16594: 40112300193AA861 = 464
16602: 4F1616061E3600CD = 415
16610: B7409130022363D23 = 592
16618: 10F3232323152DCD - 662
16626: C906182A0C40237E = 510
16634: FE7628205C6807718 = 889
16642: F510F3C92A0C4011 = 840
16650: 9001198634CDF340 = 800
16658: 0EFF067D10FE0D20 = 715
16666: F9CDF340C9CDB802 = 1358
16674: 7DFEFF28233 2AC61 = 998
16682: 3AAC614F3AAA6157 = 815
16690: 3AAB615F26000CB51 = 711
16698: 200A7BFE3128051D = 494
16706: 78D621470B492007 = 763
16714: 7AFE0228021505CB = 645
16722: 41200A7BFE162805 = 551
16730: 1078D621470B7120 = 798
16738: 077AFE1F28021404 - 400
16746: 7A32AA617B32AB61 = 880
16754: 7832AD61C92A0C40 = 755
16762: 3AAA61472310FD3A = 758
16770: AB6147112100191 0 = 430
16778: FDC90E1BCD77413A = 942
16786: AD615F1600FEC838 = 897
16794: 0218FF19066410FE = 680
16802: 7EFE3D2813FEBD28 = 983
16810: 10FE02200037113EB = 631
16818: 79FE18C00E0018D4 = 844
16826: 36BD0E00CDE34118 = 778
16834: CB3600C9CD774136 = 901
16842: 00CD1F41CD77417E = 815
16850: FE3DCA7641363A3A = 864
16858: AD61FE00C8CD8C41 = 1134
16866: C92A0C4011140019 = 381
16874: 7EFEA5280234C936 = 894
16882: 9C2B18F4CD77410E = 870
16890: 0A3634E5CDF340E1 = 1082
16898: 36BDE5CDF340E1CD = 1222
16906: 20EF3500ED7B7B40 = 672
16914: C93AA861FE042021 = 821
16922: AF3C32AE61FE02CA = 1030
16930: 3F42C95042FE0C3A - 940
16938: C7423E44287AA94 = 1255
16946: 9C9C9C9C9C

*Figure 3.*

16959: 215242228422A0C = 469
16967: 4011F5021193AAA61 = 678
16975: 3D182B5F76BFD036 = 791
16983: 00E5231836216E42 = 551
16991: 2286422A0C4C11F5 = 614
16999: 02193AA861180F5F = 487
17007: 79BAD03600ED511 = 1028
17015: 210019D11811570E = 413
17023: 18061E7EFE3DCC6E = 813
17031: 422D10F72D2E2B05 = 514
17039: 20EFC97EFE3D2810 = 969
17047: FE34CAF6413F3440 = 993
17055: CB472804363DE1C9 = 859
17063: E1C9DD95 70E000b = 648
17071: 007EFE3DCCFF4223 = 992
17079: 0478FE1E20F32323 = 753
17087: 230C79FE1520E8C9 = 909
17095: 21DA4222B1422F0C = 651
17103: 401123001193AAA61 = 466
17111: 3D18D15F73BAD838 = 965
17119: 00E52B18AE21F642 = 815
17127: 22B4422A0C401123 = 450
17135: 00193AAE6118B55F = 651
17143: 79BAD03602ED511 = 1036
17151: 2100ED52D1188C2A = 767
17159: 0C401178011906 08 = 253
17167: 0E011608D5112100 = 311
17175: C5772310FD77190D = 776
17183: 20FBC104C0C5772B = 851
17191: 10FC77ED520D20FA = 1001
17199: C1040C18FF1520FD = 792
17207: 011520D8C9ED737B = 1154
17215: 40CD9C402A0C4011 = 624
17223: 0A001954 5D210040 - 440
17231: 010D00ED B0CDD040 = 904
17239: CD0641CDC541CD13 = 968
17247: 427BFE3028F52186 = 958
17255: 43545D2A0C40010A = 376
17263: 000901CD00ED B03E = 498
17271: 88CD06433E80CD06 = 815
17279: 43AFCD06433C90643 = 794
17287: C98888A38487AA94 = 1370
17295: 9C9CA1A49C8818

*Figure 4.*

17303: 213F4308043S9C23 = 498
17311: 10FB21A881130223 = 656
17319: 0C41CDCD40CD3C40 = 1035
17327: FE7628151801CDD8 = 891
17335: 43CD6543CD5443FE = 1050
17343: 7838C621A8613418 = 538
17351: ED3AA961FE9106CD = 1376
17359: 6543180621A8136 = 760
17367: 1023360C2333FBC9 = 658
```

Amsnake

P R King,
Ipswich,
Suffolk.

Amstrad

NOTHING UNUSUAL about this — just another snake game. Except for the fact that this game is fast, is entirely in Basic, becomes increasingly more difficult and the snake looks something like a snake. Seriously though folks, it should appeal to all levels of dexterity as it does start off fairly easy and becomes gradually more difficult.

The object of the game is to guide your snake around the screen, eating rats and avoiding mushrooms, the walls and of course — the snake. Your score increases with the length of the snake and so far my record is: 21,420 points, so type it in and have fun.

```
10 '*************************************
20 '*****                         *****
30 '*****        Amsnake          *****
40 '*****                         *****
50 '*****          P. King        *****
60 '*****                  1985   *****
70 '*****                         *****
80 '*************************************
90 GOSUB 150:'def chars & set up
100 GOSUB 390: 'title & start
110 GOSUB 530:'screen
120 GOSUB 730:'play game
130 GOSUB 960:'end game
140 GOTO 110
150  ******* def chars & setup *******
160 mm=HIMEM:MEMORY 30000
170 DEF FN point(a,b)=TEST((a*16)-6,(406-b*16))
180 INK 3,6:INK 0,23:INK 1,9:INK 2,0
190 SYMBOL 240,&24,&18,&3C,&3C,&7E,&DB,&DB,&7E
200 SYMBOL 241,&7E,&DB,&DB,&7E,&3C,&3C,&18,&24
210 SYMBOL 242,&6,&F,&B9,&7F,&7F,&B9,&F,&6
220 SYMBOL 243,&60,&F0,&9D,&FE,&FE,&9D,&F0,&60
230 SYMBOL 244,&24,&5A,&BD,&66,&E7,&99,&5A,&3C
240 SYMBOL 245,&3C,&5A,&99,&E7,&66,&BD,&5A,&24
250 SYMBOL 246,&2C,&5A,&B9,&67,&67,&B9,&5A,&2C
260 SYMBOL 247,&34,&5A,&9D,&E6,&E6,&9D,&5A,&34
270 SYMBOL 248,&3C,&66,&5A,&66,&24,&3C,&18,&18
280 SYMBOL 249,&18,&18,&3C,&24,&66,&5A,&66,&3C
290 SYMBOL 250,&0,&70,&3C,&A7,&A7,&DC,&70,&0
300 SYMBOL 251,&0,&E,&3B,&D5,&D5,&3B,&E,&0
310 SYMBOL 252,0,0,4,&2E,&5F,&FF,2,&1C
320 SYMBOL 253,0,&3C,&42,&81,&BD,&5A,&18,&3C
330 SYMBOL 254,&24,&3C,&FF,&66,&66,&FF,&3C,&24
340 SYMBOL 255,&E7,&A5,&FF,&24,&24,&FF,&A5,&E7
350 ENV 1,1,15,1,15,-1,3
360 ENT 1,10,-5,1,10,5,1
370 ENV 2,5,3,2,15,-1,15
380 RETURN
390  ******* title & start ***********
400 CLS:BORDER 23
410 PEN 1:LOCATE 6,2:PRINT"*******    AMSNAKE    *****
**
420 PEN 3:LOCATE 6,6:PRINT"The object of the game is t
o guide"
430 PRINT:PRINT"your snake around the screen  using the"
440 PRINT:PRINT"keys shown below. eating the black rats"
450 PRINT:PRINT"but avoiding the mushrooms.    For eac
h"
460 PRINT:PRINT"rat you eat your snake will grow longe
r"
470 PRINT:PRINT"and the longer the snake is the greate
r"
480 PRINT:PRINT"your score will be."
490 PRINT:PRINT:PRINT"A = UP  Z = DOWN    / = LEFT  \
= RIGHT"
500 PEN 1:LOCATE 8,24:PRINT"PRESS ANY KEY TO CONTINUE"
510 Z$=INKEY$:IF Z$="" GOTO 510
520 RETURN
530  ********** draw screen **********
540 MODE 1:PAPER 0:BORDER 23:CLS:PEN 3
550 FOR z=1 TO 40:LOCATE z,1:PRINT CHR$(255):LOCATE z,
23:PRINT CHR$(255):NEXT z
560 FOR z=2 TO 22:LOCATE 1,z:PRINT CHR$(255):LOCATE 40
,z:PRINT CHR$(255):NEXT z
570 PEN 1:LOCATE 8,13:PRINT CHR$(251);CHR$(247);CHR$(2
43)
580 ea=30001:eb=30002:ec=30003:fa=30007:fb=30008:fc=30
009
590 POKE ea,8:POKE eb,13:POKE ec,4:POKE 30004,9:POKE 3
0005,13:POKE 30006,4:POKE fa,10:POKE fb,13:POKE fc,4
600 FOR z=1 TO 3
610 c=INT(RND*38)+2
620 d=INT(RND*21)+2
630 IF FN point(c,d)<>0 GOTO 610
640 PEN 1:LOCATE c,d:PRINT CHR$(253)
650 c=INT(RND*38)+2
660 d=INT(RND*21)+2
670 IF FN point(c,d)<>0 GOTO 650
680 PEN 2:LOCATE c,d:PRINT CHR$(252)
690 NEXT z
700 LOCATE 3,25:PEN 2:PRINT"score: ";STR$(sc):LOCATE 2
4,25:PRINT"hi score: ";STR$(hi)
710 length=3
720 RETURN
730 '********** play game **********
740 PEN 1:sc=0
750 z$=INKEY$
760 IF z$="a" OR z$="A" THEN dir=1
770 IF z$="z" OR z$="Z" THEN dir=2
780 IF z$="/" OR z$="?" THEN dir=3
790 IF z$="\" OR z$="`" THEN dir=4
800 a=PEEK(fa):b=PEEK(fb)
```

```
810 IF dir=0 THEN dir=4
820 IF dir=1 THEN b=b-1
830 IF dir=2 THEN b=b+1
840 IF dir=3 THEN a=a-1
850 IF dir=4 THEN a=a+1
860 p=FN point(a,b):IF p=0 OR p=2 GOTO 880
870 IF p=1 OR p=3 THEN RETURN
880 LOCATE a,b:PRINT CHR$(239+dir):LOCATE PEEK(ea),PEE
K(eb):PRINT"
890 LOCATE PEEK(fa),PEEK(fb):PRINT CHR$(243+PEEK(fc))
900 LOCATE PEEK(ea+3),PEEK(eb+3):PRINT CHR$(247+PEEK(e
c+3))
910 fa=fa+3:fb=fb+3:fc=fc+3:IF p=2 GOTO 920 ELSE ea=ea
+3:eb=eb+3:ec=ec+3
920 POKE fa,a:POKE fb,b:POKE fc,dir
930 IF p=2 THEN GOSUB 1050
940 GOTO 750
950 RETURN
960 '*********** end  game ***********
970 SOUND 4,0,0,0,2,0,15
980 FOR Z=0 TO 26:INK 0,Z:BORDER Z:FOR Y=1 TO 50:NEXT
Y,Z
990 INK 0,23:BORDER 23
1000 DIR=0:SC=0:LENGTH=3
1010 Z$=""
1020 LOCATE 5,12:PEN 2:PRINT"PRESS SPACE BAR FOR ANOTH
ER GAME"
1030 z$=INKEY$:IF z$<>" " GOTO 1020
1040 RETURN
1050 '************* score *************
1060 SOUND 4,60,0,0,1,1
1070 c=INT(RND*38)+2
1080 d=INT(RND*21)+2
1090 IF FN point(c,d)<>0 GOTO 1070
1100 LOCATE c,d:PEN 1:PRINT CHR$(253)
1110 c=INT(RND*38)+2
1120 d=INT(RND*21)+2
1130 IF FN point(c,d)<>0 GOTO 1110
1140 LOCATE c,d:PEN 2:PRINT CHR$(252)
1150 sc=sc+length*10:length=length+1
1160 IF sc>hi THEN hi=sc
1170 sc$=STR$(sc):LOCATE 9,25:PEN 2:PRINT sc$
1180 hi$=STR$(hi):LOCATE 34,25:PRINT hi$
1190 PEN 1:SOUND 132,0:RETURN
```

Disc utility

Matthew Desmond,
Cholmsford,
Essex.

CBM-64

THIS IS A program for a Commodore 64 plus 1541 Disc drive. The program enables the user to enter disc commands without the need for the open statement. The facilities are: Directory, Format, Scratch, Re-name, Initialise, Validate and Copy. Disc Utility is menu drive, fully "mug trapped" and disk status is shown after every operation.

Line Description.

10-1140 Main Set Up
1150-1210 Wait for a Key Press
1220-1290 Read Error From Disck
1300-1510 Main Menu
1520-1550 End Program Routine
1570-1700 Directory Routine
1710-1850 Format Routine
1860-1980 Scratch Routine
1990-2160 Re-name Routine
2170-2290 Initialise Routine
2300-2420 Validate Routine
2430-2840 Copy Routine
2850-3010 Machine Code Disassembly

The machine code reads a character from the disc for the directory.

```
1000 REM*************************
*******
1010 REM          DISK  UTILITY
1020 REM  BY MATTHEW DESMOND (C)
 1984
1030 REM*************************
*******
1040 DIM MF$(10):MF=8
1050 FORA=1TO8:READ MF$(A):NEXT
A
1060 DATADIRECTORY,FORMAT,SCRATC
H
1070 DATARE-NAME,INITIALISE,VALI
DATE
1080 DATACOPY,END
1090 FORA=50030TO50020
1100 READB:POKEA,B:NEXTA
1110 DATA 162,3,32,198,255,32,20
7
1120 DATA 255,32,210,255,208,246
,169
1130 DATA 13,32,210,255,76,204,2
55
1140 GOTO 1303
1150 REM*************************
*******
1160 REM**** WAIT FOR  A KEY PRE
SS ****
1170 REM*************************
*******
1180 PRINTTAB(13)"■* PRESS A KE
Y *■■"
1190 POKE198,0
1200 GETA$:IFA$=""THEN1200
1210 RETURN
1220 REM*****************************
*******
1230 REM**** READ ERROR  FROM DI
SK ****
1240 REM*************************
*******
1250 OPEN15,8,15
1260 INPUT#15,A,B$,C,D
1270 CLOSE15
1280 PRINT"■■ DISK STATUS  :";A;
B$;C;D
1290 RETURN
1300 REM*************************
*******
1310 REM************ MENU. *****
*******
1320 REM*************************
*******
1330 POKE53280,8:POKE53281,1
1340 PRINT"■";
1350 PRINTTAB(14)"■_____"
1360 PRINTTAB(14)"■DISK UTILITY"
1370 PRINT"■■"
1380 PRINTTAB(16)"■********"
1390 PRINTTAB(16)"■* MENU *"
1400 PRINTTAB(16)"■********"
1410 PRINT
1420 FORA=1TOMF
1430 PRINT"■",A,"■■) ";"■";MF$(
A)
1440 NEXTA
1450 PRINT"■■■WHICH FUNCTION DO
YOU REQUIRE? ";
1460 GOSUB1130:A=VAL(A$)
1470 IFA<1ORA>MFTHENGOTO1460
1480 PRINT"■";A$;"■"
1490 ONA  GOTO1570,1710,1860,199
0,2170
1500 ONA-5GOTO2300,2430,1520
1510 GOTO1460
1520 REM*************************
*******
1530 REM************ END ******
*******
1540 REM*************************
*******
1550 PRINT"■■■GOODBYE.■"
1560 END
1570 REM*************************
*******
1580 REM********** DIRECTORY ***
*******
1590 REM*************************
*******
1600 PRINT"■";:PR=0
1610 PRINT"■_____"
1620 PRINT"■■DIRECTORY:■"
1630 PRINT"■PLEASE LOAD DISK":GO
SUB1150
1640 OPEN3,8,0,"$0":GETH3,A$,A$
1650 GETH3,A$,A$,BL$,BH$
1660 IFA$=""THENCLOSE3:GOTO1780
1670 BL$=BL$+CHR$(0):BH$=BH$+CHR
$(0)
1680 PRINT256*ASC(BH$)+ASC(BL$),
1690 SYS50000:GOTO1650
1700 GOSUB1150:GOTO1300
1710 REM*************************
*******
1720 REM*********** FORMAT. ****
*******
1730 REM*************************
*******
1740 PRINT"■";:ID$="":DN$=""
1750 PRINT"■_____"
1760 PRINT"■FORMAT:■"
1770 PRINT"■PLEASE LOAD DISK":GO
SUB1150
1780 INPUT"DISK NAME";DN$
1790 IFDN$=""ORDN$="*"ORDN$="$"T
HEN1710
1800 INPUT"DISK ID";ID$
1810 IFID$<>""THENDN$=DN$+","+ID
$
1820 OPEN1,8,15,"N0:"+DN$:CLOSE1
1830 GOSUB1220
1840 GOSUB1150
1850 GOTO 1300
1860 REM*************************
*******
1870 REM*********** SCRATCH ****
*******
1880 REM*************************
*******
1890 PRINT"■";
1900 PRINT"■_____"
1910 PRINT"■SCRATCH:■"
1920 PRINT"■PLEASE LOAD DISK":GO
SUB1150
1930 PRINT"NAME OF PROGRAM TO BE
 SCRATCHED"
1940 INPUTPN$:IFPN$=""THEN1860
1950 OPEN2,8,15,"S0:"+PN$:CLOSE2

1960 GOSUB1220
1970 GOSUB1150
1980 GOTO1300
1990 REM*************************
*******
2000 REM********** RE-NAME *****
*******
2010 REM*************************
*******
2020 PRINT"■";
2030 PRINT"■_____"
2040 PRINT"■RE-NAME:■"
2050 PRINT"■PLEASE LOAD DISK":GO
SUB1150
2060 PRINT"NEW NAME";
```

(continued on next page)

(continued from previous page)

```
2070 INPUTNN$
2080 IFNN$=""ORNN$="$"ORNN$="*"T
HEN1990
2090 PRINT"OLD NAME";
2100 INPUTOL$
2110 IFOL$=""OROL$="$"OROL$="*"T
HEN1990
2120 OPEN4,8,15,"R0:"+NN$+"="+OL
$
2130 CLOSE4
2140 GOSUB1220
2150 GOSUB1150
2160 GOTO 1300
2170 REM*************************
*******
2180 REM********* INITIALISE. **
*******
2190 REM*************************
*******
2200 PRINT"";
2210 PRINT"_____________"
2220 PRINT"INITIALISE:"
2230 PRINT"PLEASE LOAD DISK":GO
SUB1150
2240 PRINT"_____________________
_____"
2250 PRINT"INITIALISING DISK DR
IVE"
2260 OPEN5,8,15,"INITIALISE":CLO
SE5
2270 GOSUB1220
2280 GOSUB1150
2290 GOTO1300
2300 REM*************************
*******
2310 REM********** VALIDATE. ***
*******
2320 REM*************************
*******
2330 PRINT"";
2340 PRINT"_____________"
2350 PRINT"VALIDATE:"
2360 PRINT"PLEASE LOAD DISK":GO
SUB1150
2370 PRINT"_____________________"
2380 PRINT"VALIDATING DISK"
2390 OPEN5,8,15,"VALIDATE":CLOSE
6
2400 GOSUB1220
2410 GOSUB1150
2420 GOTO1300
2430 REM*************************
*******
2440 REM************ COPY. *****
*******
2450 REM*************************
*******
2460 PRINT"";
2470 PRINT"_____________"
2480 PRINT"COPY:"
2490 PRINT"PLEASE LOAD DISK":GO
SUB1150
2500 PRINT"COPY OR MERGE ? ";
2510 GOSUB1190
2520 IFA$="M"THENPRINT"M":GOTO26
20
2530 IFA$<>"C"THEN2510
2540 PRINT"C":PRINT"ORIGINAL NAM
E:";
2550 INPUTOO$
2560 IFOO$=""OROO$="$"OROO$="*"T
HEN2430
2570 PRINT"NEW NAME:";
2580 INPUTNN$
2590 IFNN$=""ORNN$="$"ORNN$="*"T
HEN2430
2600 FF$="COPY0:"+NN$+"=0:"+OO$
2610 GOTO2810
2620 PRINT"HOW MANY FILES (2-4)?
";
2630 GOSUB1190:A=VAL(A$)
2640 IFA<2ORA>4THENGOTO2330
2650 PRINTA$"
2660 MM$(1)="":MM$(2)=""
2670 MM$(3)="":MM$(4)=""
2680 FORB=1TOA
2690 PRINT"FILENAME #";MID$(STR
$(B),2);
2700 PRINT":                    ";
2710 PRINT"";
2720 INPUTMM$(B):T$=MM$(B)
2730 IFT$="*"ORT$=""ORT$="$"THEN
2690
2740 IFB<>1THENMM$(B)=",0:"+MM$(
B)
2750 NEXTB:PRINT""
2760 PRINT"NEW FILENAME:";
2770 INPUTMM$
2780 IFMM$=""ORMF$="*"ORMF$="$"T
HEN2760
2790 FF$="COPY0:"+MM$+"=0:"+MM$(
1)+MM$(2)
2800 FF$=FF$+MM$(3)+MM$(4)
2810 OPEN7,8,15:PRINT#7,FF$:CLOS
E7
2820 GOSUB1220
2830 GOSUB1150
2840 GOTO1300
2850 REM*************************
*******
2860 REM*************************
*******
2870 REM**** MACHINE CODE LISTIN
G. ****
2880 REM*************************
*******
2890 REM*************************
*******
2900 :
2910 :
2920 ,C000  A2 03     LDX #$03
2930 ,C002  20 C6 FF  JSR $FFC6
2940 ,C005  20 CF FF  JSR $FFCF
2950 ,C008  20 D2 FF  JSR $FFD2
2960 ,C00B  D0 F8     BNE $C005
2970 ,C00D  A9 0D     LDA #$0D
2980 ,C00F  20 D2 FF  JSR $FFD2
2990 ,C012  4C CC FF  JMP $FFCC
3000 :
3010 :
```

Data moving routine

Wai Kei Ho,
Aston,
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Amstrad

THIS PROGRAM is written for people who have got disc drives and want to store binary file directly from the disc into the locations occupied by the disc operating system. All addresses entered are decimal values, otherwise '&' must be added in front of those hexadecimal addresses.

The data moving routine must not be in the locations of the moved file or the destination. If the file moved does not overlap the destination file, the file will be moved from the beginning, otherwise from the end.

If moved file is stored on tape, firstly load the file into where it does not overlap the DOS; the sum of the start address and the length must be less than 42619. The store it onto disc. To run this routine, the file must first be loaded into the computer with the data moved from the start address which is calculated by yourself.

If you do not bother to calculate the routine starting point and file moved starting points, then delete the following lines:

190, 200, 250, 260, 290, 340 350 and 550

And add the following lines:

```
250 RS=42615-LM-22:MS=42615-LM:
    MT=MT+LM
260 HL=&2B:DE=&1B:lbytea=&77:
    hbytea=&A6
```

But attention must be paid that the file moved start address now indicates where to start loading data into the main memory, not where to commence moving the data. It is because you do not know the start address without calculation, so that this address must be shown. Here is an example:

File	Start address	Length	Entry point
a	4900	24576	0
b	31448	12288	32768

Hence the informations entered may be as follows:

Routine starting point	29800
Data moved starting point	30000
Length	12288
Destination	31448
Executed point	32768
Title move	

After that, use a simple program to link these three programs stored on the same disc.

```
10 MEMORY 4899
20 LOAD "a":Load "Move"
30 LOAD "b",30000
40 Call 29800
```

```
100 REM ************************
110 REM ** data moving routine **
120 REM **        for          **
130 REM **   AMSTRAD CPC 464   **
140 REM ************************
160 MODE 1:INK 3,16,25:SPEED INK 30,50
170 PEN 3:PRINT TAB(9)"* DATA MOVING ROUTINE *"
180 LOCATE 1,6:PEN 2:PRINT"Enter the following items :
":PRINT:PRINT:PRINT
190 PEN 1:INPUT"Routine starting point : ",rs:PRINT

200 INPUT"File moved starting point : ",MS:PRINT
210 INPUT"Lenght of data moved : ",LM:PRINT
220 INPUT"Address of destination : ",MT:PRINT
230 INPUT"Executed address : ",EA
240 IF rs>65536 OR MS>65536 OR MT>65536 THEN PRINT CHR
$(7):GOTO 100
250 IF MS+LM>MT THEN MF$='END' ELSE MF$="BEGINNING"
260 IF MF$="END" THEN MS=MS+LM:MT=MT+LM
270 MS$=HEX$(MS):MT$=HEX$(MT):LM$=HEX$(LM):EA$=HEX$(EA
)
280 REM ** convert addresses to hi and low bytes data
**
290 lbytea=VAL("&"+RIGHT$(MS$,2)):hbytea=VAL("&"+LEFT$
(MS$,2))
300 lbyteb=VAL("&"+RIGHT$(MT$,2)):hbyteb=VAL("&"+LEFT$
(MT$,2))
310 lbytec=VAL("&"+RIGHT$(LM$,2)):hbytec=VAL("&"+LEFT$
(LM$,LEN(LM$)-2))
320 IF EA$="0" THEN  er=&C9:ro=19:GOTO 350 ELSE er=&CD
:ro=21:GOTO 330
330 lbyted=VAL("&"+RIGHT$(EA$,2)):hbyted=VAL("&"+LEFT$
(EA$,LEN(LM$)-2))
340 REM ** increment / decrement those registers **
```

```
350 IF MF$='END' THEN HL=&2B:DE=&1B ELSE HL=&23:DE=&13
360 REM ** poke  start,destination and lenght into reg
isters respectively **
370 POKE rs,&21:POKE rs+1,lbytea:POKE rs+2,hbytea:POKE
 rs+3,&11:POKE rs+4,lbyteb:POKE rs+5,hbyteb:POKE rs+6,
&1:POKE rs+7,lbytec:POKE rs+8,hbytec
380 POKE rs-9,&7E:POKE rs+10,&12:POKE rs+11,HL:POKE rs
+12,DE:POKE rs+13,&B:POKE rs+14,&7B:POKE rs+15,&B1
390 POKE rs-16,&20:POKE rs+17,&F7:POKE rs+18,er:POKE r
s+19,lbyted:POKE rs+20,hbyted
400 REM ** data checking **
410 CLS
420 PEN 3:PRINT TAB(12)"* FINAL RESULT *":PRINT:PRINT:
PEN 1
430 ct=0:PRINT HEX$(rs)":";
440 FOR i=rs TO rs+ro-1
450 pn$=HEX$(PEEK(i)):ct=ct+1
460 IF LEN(pn$)=1 THEN pn$="0"+pn$
470 PRINT pn$+" ";
480 IF ct>7 THEN ct=0:PRINT:PRINT HEX$(i)+":";
490 NEXT i
500 LOCATE 1,7:PRINT"Routine starting point :";rs;" =&
";:PEN 3:PRINT HEX$(rs):PRINT
510 PEN 1:PRINT"Data moved start address:";ms;" =&";:P
EN 3:PRINT MS$:PRINT
520 PEN 1:PRINT"Lenght of data :";LM;" =&";:PEN 3:PRIN
T LM$:PRINT
530 PEN 1:PRINT"Store data into : ";MT;" =&";:PEN 3:PR
INT MT$:PRINT
540 IF EA<>0 THEN PEN 1:PRINT"Executed address :";EA;"
 =&";:PEN 3:PRINT EA$:PRINT
550 PEN 1:PRINT"Start moving from ";:PEN 3:PRINT MF$
560 LOCATE 14,22:PEN 2:PRINT"CORRECT ?(Y/N)"
570 fa$=INKEY$:fa$=UPPER$(fa$):IF fa$="Y" THEN 600
580 IF fa$="N" THEN RUN
590 GOTO 570
600 LOCATE 14,22:PRINT"                    "
610 INPUT"Title ";title$
620 SAVE title$.b.rs.ro
630 NEW
```

Compact

K Feary,
Wendover,
Buckinghamshire.

Spectrum

COMPACT IS A set of three routines for the 16/48K Spectrum that will allow you to reduce the size of a program and make it faster.

The first routine replaces the digits of a number with a decimal point. Since the interpreter tets for "." before Bin and numeric characters the number is found sooner. However, once this has been done you will have to retype the digits if you edit a line with numbers in, so it's best to use this routine only when the program is fully debugged. Alternatively, you can protect digits by adding Rem to the beginning of a line.

The second routine reduces long variable names to two characters. The new names will be A0, B0, C0...ZZ in the order the variables are used in the program.

The final routine will join as many lines together as possible while ensuring that the program still works and is not made slower. The line numbers in Gotos etc. must be constants, but no check is made for List, LList, or Save ""Line, so these lines may "disappear".

All the routines, especially delete digits, can take some time to compact a large program. Clearing the variables will reduce this slightly.

Type in and Run the listed program. You will be asked for the start address, any high value will do as long as the program doesn't go beyond P RamT. For instance, to put Compact just below the UDGs enter 32108 or 64876 depending on Ram size. When all the Data has been Poked the address of each routine will be printed and the code Saved. To Load the code use:

CLEAR start-1:LOAD ""CODE

The routines can then be called in the usual way, i.e.: RAND USR address of routine

```
   1 REM ***********************
   2 REM COMPACT © K.FEARY.1984.
   3 REM ***********************
   4 REM
   5 DATA 205,427+start,254,46,4
0,19,254,198,40,15,205,135,44,48
,25,254,65,56,5,205,65,41,223,24
,14,54,46,64,93,33,126,254,14,32
,250,19,208,399-start,43
   6 DATA 205,452+start,24,213,2
37,123,61,62,205,179,30,33,65,48
,34,146,92,205,427+start,205,141
,44,48,64,235,201,235,205,138,42
,48,56,34,93,92,235,217,229,205
   7 DATA 31,23,35,48,30,237,91,
146,92,205,182,42,123,28,254,90
92,10,30,92,122,20,254,57,32,2,2
2,65,237,83,146,92,205,255,42,21
7,225,217,209,35,237
   8 DATA 160,237,160,223,205,39
9+start,43,205,452+start,24,182,
42,83,92,205,366+start,32,101,23
1,246,128,42,89,92,254,235,40,73
,254,237,229,246,204,347+start,2
41,225,40
   9 DATA 25,35,254,236,40,242,2
54,247,40,238,254,250,40,49,254,
254,40,45,254,254,40,41,254,229,
32,40,231,205,72,32,1,0,0,254,46
,40,7,10,22,205,27
  10 DATA 45,56,117,62,14,71,237
,177,205,180,91,126,205,72,32,32
,100,205,193,30,95,105,205,347+s
tart,223,254,234,40,5,205,57,30
46,150,42,65,92,24,150,42
  11 DATA 83,92,205,321-start,20
5,184,25,205,205,321+start,229,2
05,360+start,203,126,225,40,240,
225,213,235,17,0,0,205,138,25,35
,205,136,25,62,254,146,202,225,2
50,103
  12 DATA 254,13,19,213,84,93,35
,35,78,35,70,35,197,205,229,25,4
3,54,58,193,225,94,35,86,235,9,2
35,114,43,115,43,43,24,186,126,2
30,192,200,42,83,92
  13 DATA 126,230,192,194,176,27
,229,205,360+start,203,254,225,2
05,184,25,235,24,237,205,110,25,
126,230,192,192,205,360+start,20
3,190,201,35,35,35,195,171,40,12
6,230,192
  14 DATA 192,50,71,92,86,35,94,
237,83,69,92,35,229,221,225,94,3
5,86,34,93,92,25,35,34,85,92,237
,98,217,201,205,221,25,197,196,2
32,25,217,193,9,217
  15 DATA 201,126,205,182,24,254
,34,34,93,92,192,35,71,237,177,2
4,240,42,83,92,205,366+start,194
,176,27,231,253,52,13,254,206,32
,9,35,205,411+start,254,41,32
  16 DATA 248,35,205,411+start,2
54,56,40,232,254,203,40,228,254,
234,40,3,254,13,192,217,221,94,0
,221,86,1,235,237,82,221,117,0,2
21,116,1,42,85,92,24,194
  20 INPUT "start address?";star
t
  30 IF start+491>PEEK 23732+256
*PEEK 23733 THEN GO TO 20
  40 RANDOMIZE start: CLEAR star
t-1: LET start=PEEK 23670+256*PE
EK 23671
  50 FOR a=0 TO 491: READ b: IF
b>255 THEN RANDOMIZE b: POKE sta
rt+a,PEEK 23670: LET a=a+1: POKE
 start+a,PEEK 23671: GO TO 70
  60 POKE start-a,b
  70 NEXT a
  80 PRINT "Delete digits :- ";s
tart'"Shorten var names :- ";sta
rt+46'"Join lines :- ";start+136
```

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Info North

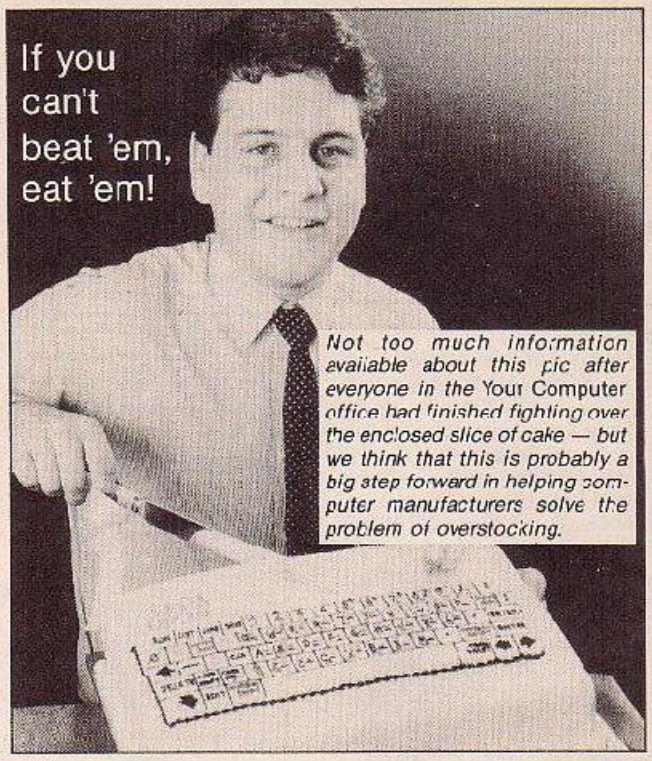
The Information Technology and Office Automation Exhibition takes place at Belle Vue, Manchester from September 17 to September 19. Open to the general public, more details available from BED Exhibitions, 44 Wallington Square, Wallington, Surrey. Telephone 01-647 1001.

Personal Computer World Show

At Olympia, London from 4-8 September, a show for home and business users, trade and public. For more details, telephone 01-486 1951.

BBC Micro User Show

UMIST, The University of Manchester Institute of Science and Technology hosts the BBC Micro User Show from September 27-29. £2 to get in if an adult, £1.50 for non-adults. Telephone Database Publications, Stockport for more details 061 429 8080.



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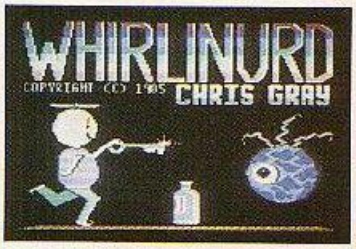

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